The Independent Guide to IBM Personal Computers

Volume 1 Number 4 $3.00

Spreadsheet Contenders at Ringside

Megaforces Unite: IBM & Sears

PC's Shake Up the NCC Show

How Much Are You REALLY Worth? see P. 64

VisiCalc Vs. SuperCalc

A Head-to-Head Comparison

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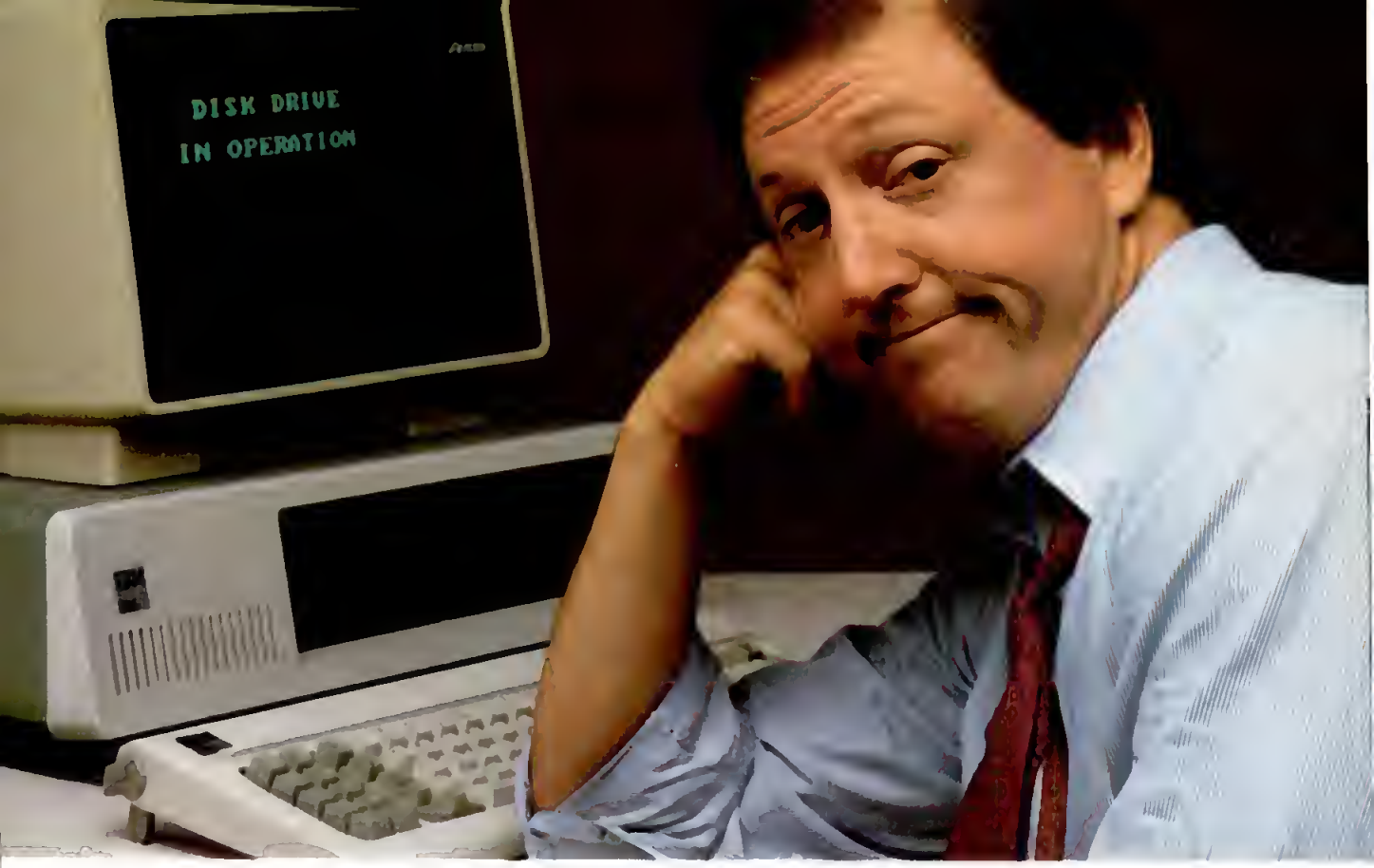

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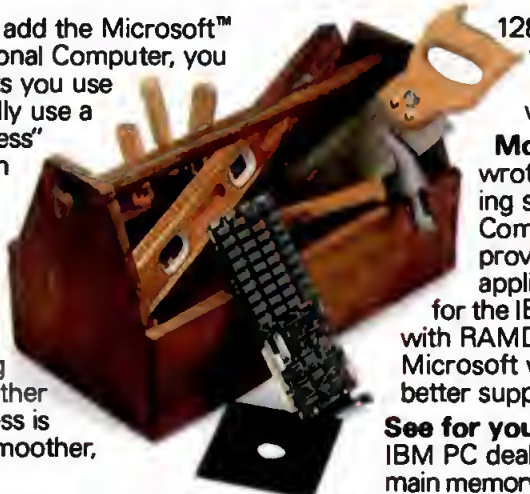

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PC
The Independent Guide to IBM Personal Computers

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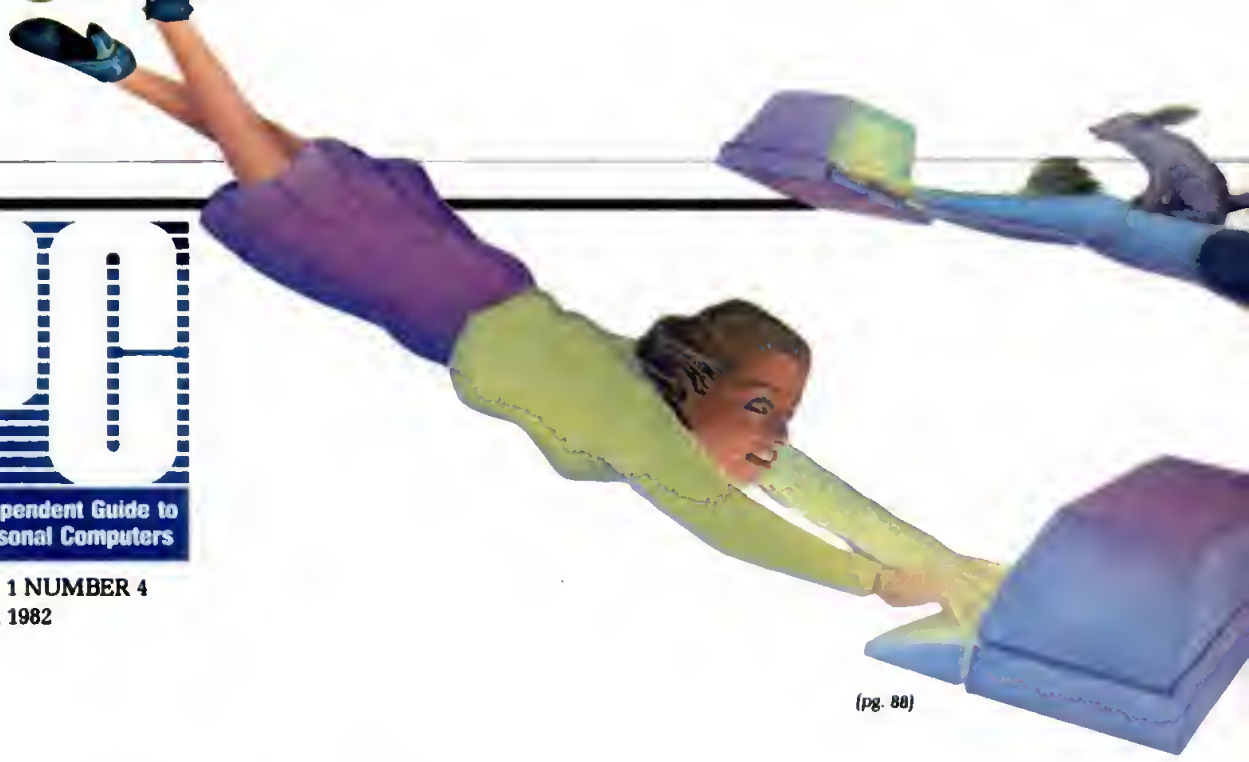
AUGUST, 1982



(pg. 88)

In This Issue

PC INTERVIEW

An Interview with *VisiCalc* Entrepreneur Daniel Fylstra/David Bunnell & Lawrence J. Magid 28
A beind the scenes look at the evolution of *VisiCalc* and the company responsible for its marketing success, VisiCorp.

BUSINESS

The More PCs the Merrier/Jim Strothman 44
IBM ups corporate demand for the PC with markdowns on bulk buying.

EVENTS

NCC Roundup/David Bunnell 50
The IBM PC finds a fertile home at Houston's sprawling Astrodomain.

Of Camels and Tents/ Jim Edlin 56
After years of neglect and distain, personal computing comes of age at the NCC.

(pg. 50)

FINANCE

How Much Are You Really Worth?/Andrew Williams 64
How to see your material ambitions through a spreadsheet looking glass.

SOFTWARE

Calc Wars/Andrew Fluegelman 71
A major contender vies for the spreadsheet throne.

The Challenger: *Multiplan*/Andrew Fluegelman 85
Battlecries from another contestant: a spreadsheet plan with multivision.

MARKETPLACE

Mega Forces Unite/ Danny Goodman 88
Strange bedfellows indeed: Sears stores may be where America shops for the IBM Personal Computer.

(pg. 103)

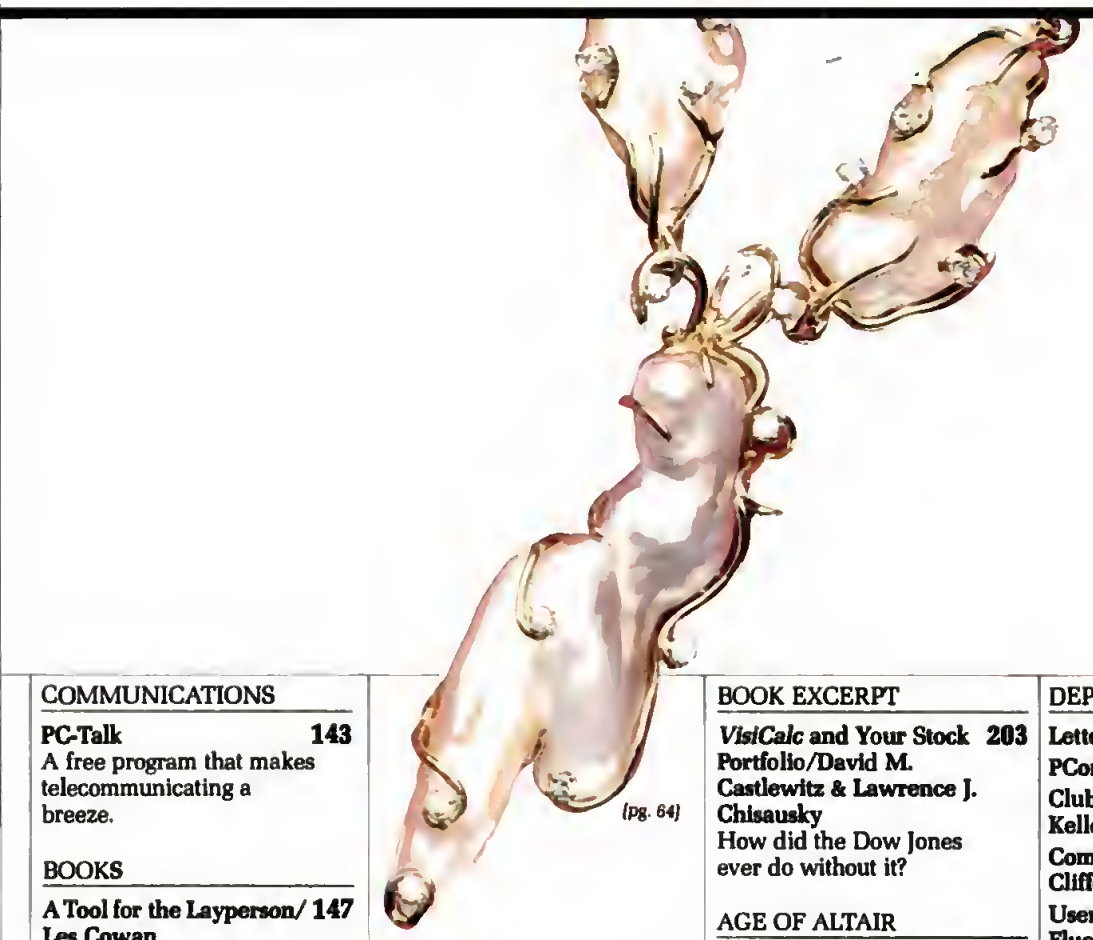
OPERATING SYSTEMS

The Bithood Question/ Hal Glatzer 103
Should you boast about the size of your binary system?

IBM Updates DOS to 1.10/Bob Rice 111
An operating system from our imperial wizards that finally owns up to the IBM name.

PC PROFILE

The Computer that's Literally for the Birds/ Jeremy Joan Hewes 125
Diana Herron's unusual data base program.



COMMUNICATIONS

PC-Talk **143**
A free program that makes telecommunicating a breeze.

BOOKS

A Tool for the Layperson/ Les Cowan **147**
It reads like a college textbook but the vocabulary is elementary: *The IBM Personal Computer.*

PRODUCT REPORTS

***PC* Reviews the Smith-Corona TP-1 Printer/ Frank J. Derfler** **167**
A daisy wheel printer that may fool the shrewdest execs.

(pg. 72)

(pg. 64)

PC LAB

***PC* Takes a Look at IBM's Pascal Compiler/ Dr. Larry Press** **171**
For some, the answer; for others, despair.

FOLLOW-UP

***EasyWriter* Resurrected/ Andrew Fluegelman** **180**
A program worth waiting for at no cost to those who jumped the gun.

New Software Submission Guidelines from IBM/Les Cowan **185**
What to do with your grand ideas, plus some hints for success.

AT HOME

The Computer Workstead/Jeremy Joan Hewes **194**
How to shirk the drudgery of 9 to 5 with the PC as your taskmaster.

BOOK EXCERPT

***VisiCalc* and Your Stock Portfolio/David M. Castlewitz & Lawrence J. Chisausky** **203**
How did the Dow Jones ever do without it?

AGE OF ALTAIR

The Grand and Glorious Crusade/David Bunnell & Eddie Currie **219**
Part IV reveals how the MITS megalopolis dominated the early personal computer scene.

COLUMNS

David Bunnell **17**
From the publishing jungle.

Zero Base Thinking/Jim Edlin **18**
Save the cracks.

Jean Yates & Dr. Rebecca Thomas **145**
The Visi-Calculator Dream Machine, a utopian view of the "visi" phenomenon brought down to an affordable price.

DEPARTMENTS

Letters to PC **11**
PCommuniques **23**
Club News/Susan R. Keller **98**
Communications Briefs/ Clifford Barney **129**
User-to-User/Andrew Fluegelman **131**
Book Briefs/Les Cowan **150**
New on the Market **153**
PC Tutor/Bob Rice **163**
Directory **211**
Advertiser Index **222**
Wish List **224**

COVER

Photo—Dennis Bettencourt
Tattoo Art—Lyle Tuttle

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Associate Editors: Lawrence J. Magid, Jeremy Joan Hewes, Andrew Fluegelman
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Associate Publisher & Director of Marketing

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JACQUELINE POITIER
Assistant Publisher/Art & Production

BRIAN DESSIN DAY
Design Director

Associate Art Director: Mick Wiggins
Production Artists: Suzanne Anderson, Monica Thorsnes
Illustrators: Suzanne Anderson, Mick Wiggins, Jeck Desrocher, Marc Ericksen, Linda Herrison, Jim Ludke, Don Nace, Linda Nace, Stuart Vinodhara, J.T. Morrow, Chandra Clarke, Burrell Dickey. **Photographers:** Dennis Bettencourt, Jacqueline Poitier. **Production Coordinators:** Niki Stranz, Esther Davies

SHERI L. BROWNE
Director of Administration

Assistant to the Publisher: Noreen Giannini. **Subscription Coordinator:** Lorrie Poch. **PC Helpers:** Jennifer Poitier, Mara Bunnell, Aaron Bunnell

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Letters To PC

Can't Cut Up

I wish to congratulate you for publishing PC. It is a very interasting and useful publication that can be understood by readers with littla technical background and computer professionals. I have noticad one problem, however. When I want further information about any of your ads, I aither have to write a letter to the company or cut out the coupon. The latter is something I will not do to your magazina—it would be a sacrilege! I suggest you add a customer service card.

Luis F. Rico
San Sebastian, Puerto Rico

Hold on to your scissors. PC's Reoder Informotion Service should commence by eorly foll.—Ed.

Copy Protection

I will not buy copy-protected softwara because it defeats the purpose of having programmable instructions.

D.W. Hornbrook, Jr.
Marshall, Arkansas

Employees Buy Big

As an IBM employea, I found out information that IBM doesn't want disclosed, so I can't identify myself. IBM's initial offar to sell amployees PCs brought in 60,000-plus orders—just employees—in one month.

Anonymous

Upgrades to 16 Bits

I recently decided to upgrade to a 16-bit computer. I first purchased the *IBM Technical Reference Monuol* and later bought the PC. Why did I buy the technical manual first? I wanted to know if there was any reason the Tandon disk drives could not be replaced with my MPI B51 drives.

Last week I brought home my newly acquired PC system with the DOS manual, a disk controller board, color graphics board, and an additional 16K of mamory. That same evening I was up and running with the DOS and one of the B51 drives.

Unfortunately, when I attached the second disk drive, neither drive would work. I found out that making the "MUX" connection on the MPI shunt socket, as dascribed for the Tandon drive in the *Technicol Reference Monuol*, does not work on the MPI drives, as the drive electronics are then enabled all the time. The outputs of the two drives "buck" each other.

Fortunately, no damage can occur with open-collector drive circuits. Solution: Do not make the "MUX" shunt connection. Also, the disk controller board places a logic "low" on pin 34, SIDE SELECT, and this must always be logic "high" for the MPI B51 drives.

The following information will allow anyone else who wants to use MPI B51 drives to be up and running in no time with the PC and DOS:

- Enable DRIVE SELECT with Pin 12 input signal;
- Enable HEAD LOAD with DRIVE SELECT;
- SIDE SELECT (pin 34) must always be logic "high."

The above can be accomplished by placing two jumpers across the following pins of the shunt socket on the MPI drives: 1-14 (HL with DS); 3-12 (DRIVE SELECT with pin 12); and cutting the trace on the MPI drive PCB going to pin 34, allowing this pin to stay in the high state.

Note: The termination resistor pack (150 ohm pullup resistors) should be left in tha "A" drive only; remove this pack from the "B" drive, but place a 150 ohm resistor across pins 2-13 of this socket. This is the pullup for SIDE SELECT, pin 34.

Kim B. Lignell
Addison, Illinois

Otherwise Excellent

I enjoy reading your magazine. So far it has not disappointed me, but I do have ona complaint. It is technical and has nothing to do with computers.

Would you please be careful when printing text onto art backgrounds? I have noticed that in the last two issues (specifically in "Boca Diary" and "CP/M's Craator") this was done in an unrestrained manner. The result is a headacha for some readars and slow reading for othars, who must pick characters out of the background in order to make sense of words. You should never run text over anything heavier than a 30 percent screen.

I agree with the reader who wrota about your end-to-and makeup. Not having it is the biggest downfall of magazines such as BYTE, whose only purpose is to force the reader to view ads on his way to the rest of the articla. Paradoxically, I am for lots of ads, as they not only add revanue, but inform the readar about available products. The only problem with these ads is that the agencies that put them together don't quite know how to handle computer ads, and some of them appaar to be years behind the times in styla. Thank you for an otherwise excellent magazine.

Randolph R. Madara
Forast Park, Illinois

Internal Mysteries

You have an excellent magazine, espacially in view of its hasty organization. I especially like tha read-through format. In spite of the need for revenue, try to avoid emulating BYTE in terms of advertising

Letters To PC

voluma. While I applaud your resolution to keep it simple for the novice, I would like to see more highly technical articles as the intarnal mysteries of the PC are deciphered.

I have had good results with the PC and Smartmodem using the 9-line RS-232 cable ($28 for 10 feet) from Inmac Corporation, which extends lines 1 through 8 and 20, and is stocked in up to 100-foot lengths. Keep articles on asynch communication coming.

Phil Van Heurck
Chicago, Illinois

Disillusioned Again

I recantly purchased the IBM PC and have already become disillusioned with all the hurrah. Among the many shortcomings of the operating system and utilitias, the most serious flaw I have found is in the color graphics interfaca. I purchased an Amdak Color-I composita monitor with my IBM, knowing that the resolution would not be as good as a RGB-type monitor, but I was shocked to find out just how bad it is!

Whila axparimenting with BASIC shortly after starting my new IBM, I discovered that large sections of circles drawn in certain colors were missing. Even the IBM damo programs displayed noticeable gaps in the graphics.

Thinking I had a defective board, the local ComputerLand discovared that all their boards displayed the same effect on any kind of composite monitor (including biack and white) except RGB.

After further experimentation, I wrote a program to draw verticai lines on alternating columns and found that there was indeed a pattern to the problem. I seems that on aven columns one color is displayed and yet another color is displayed on tha odd columns. In the cases of red and blue, one of the halves is the background color, so half the dots on tha screen do not appear at all. Serious gaps in sharp diagonal lines or vartical lines happan to occur on the wrong columns. Other colors are mixes of different colors on odd and even columns, resulting in muddy colors.

Graphics and even text displayed in color on the composite output of the color graphics interfaca are illegibla and seriously degraded. IBM claims their board is just too high resolution to display properly on a composite monitor, but how can it be advertised as compatible? Their explanation is unsatisfactory, and I suspect there is a flaw in their RGB to composite conversion circuit.

I gave in and purchased an Amdek Color-II. It's expensive, but at least it works. I hope this will warn prospective IBM customers who are planning to use color graphics.

David Wedemeyar
Metairie, Louisiana

Enthusiasm Catches On

Congratulations on your mova to a parfect-bound format. The enthusiasm you consistently generate about the PC, and micros in general, is catching. With a copy of the charter issue I feei like I bought Coca-Cola stock at 25 cents a share.

Wouid you consider mailing PC in a plain brown wrapper now that it's grown so fat? I'm not worried about my naighbors discovering my prediliction for hard- and soft-ware; I'm mora concerned with raceiving my PC intact. My copy of tha June/July issue arrived witn the back covar in such a state that I wondared if thay ever faed the backroom critters at my local post office.

Apart from this inconvenienca, your latest issue was superb. Most useful was the SPEEDUP.COM listing in *User to User*; the drives really do sing now.

I'm also grateful for the article "Making Your Link" by Clifford Barney dealing with teiecomputing, and espacially Richard Stock's piece on the Smartmodem and PCModam, entitled "Three Communication Go Togethers." I'm about to diva into this water with my own PC, and I appreciate knowing thera's a lifaguard somawhere on tha beach.

I look forward with great anticipation to your catalog issue. I learn a lot scanning *Infoworld* and *BYTE* for news on product availability, but I'll be happy to find it all in one place.

Paul Schwartz
Berkeley, California

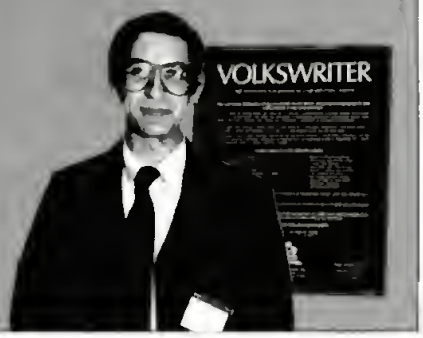
PC welcomes letter from reoders. Write to: Letters, PC, 1528 Irving St., San Francisco, CA 94122. Letters published may be edited.

Corrections

We regret to inform you of on error in the June/July 1982 PCommuniques, *"Graphics on Monochrome; OCR for Free." Worning from IBM: The color grophics odapter connot be used with the IBM PC Monochrome Disploy. The IBM Monochrome Display is designed to run ot 18.4 kilohertz horizontol frequency. The color grophics cord is designed to run ot 15.75 kilohertz horizontol frequency. You should not connect the monochrome display to the color grophics odopter cord os it may couse the high-voltoge power supply within the monochrome display to exceed operoting specifications. Such connection frequently couses domoge ond foilure to the monochrome disploy und voids the IBM warronty.*

Our opologies go to Mr. Hol Glotzer for having credited Jim Strothmon with Hol's article "Perspectives On Protection" in PC's Vol. 1, No. 2 issue —Ed.

We also wish to upologize tn Camillo Wilson for incorrectly identifying him os the person pictured on page 60 in PC's Vol. 1, No. 3. Here is the reol Comillo Wilson.



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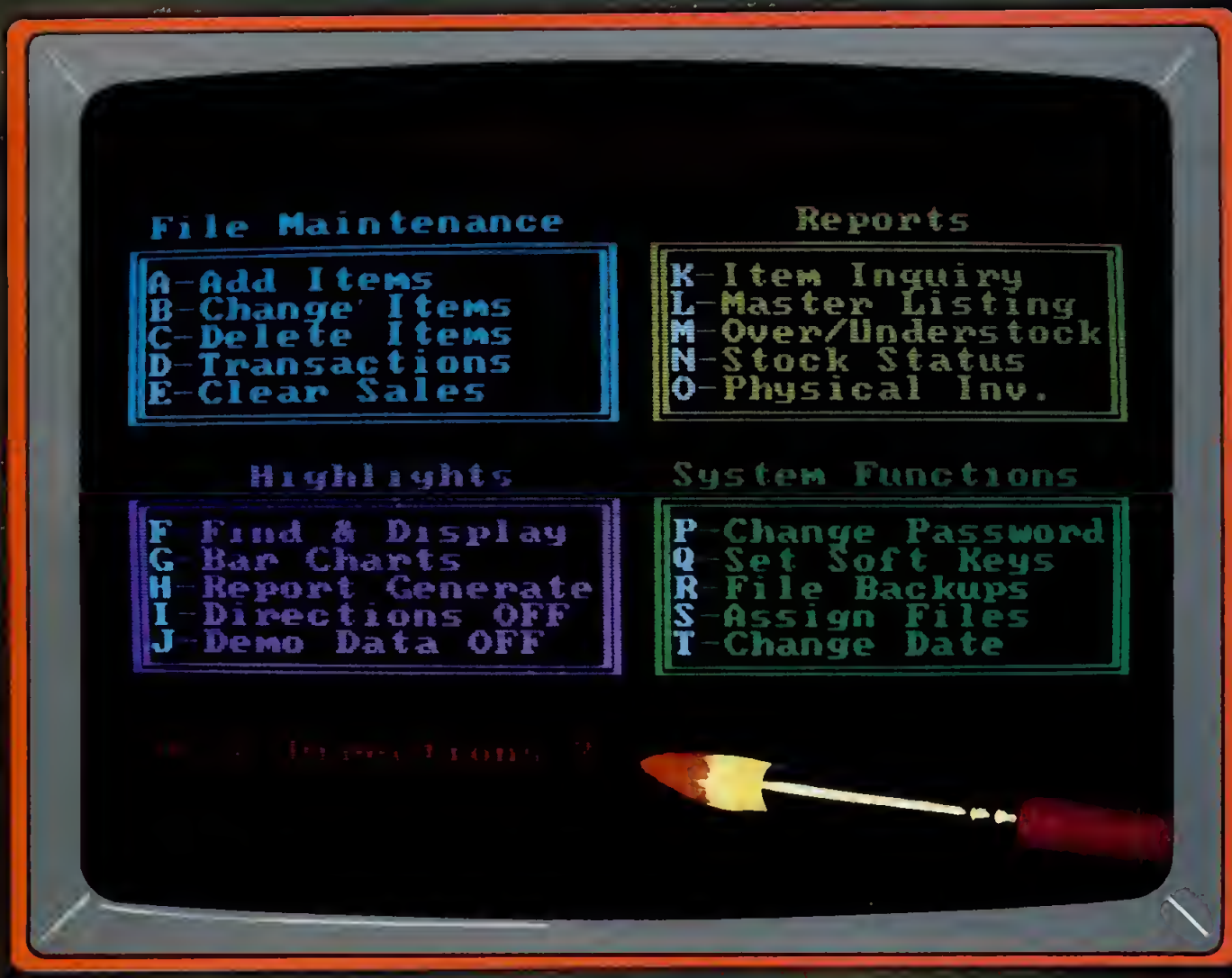

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DAVID BUNNELL

From The Publishing Jungle

Illustration: Linda Harrison

With *VisiCalc* as our compass and the IBM Personal Computer as our inspiration, we at *PC* magazine have hacked our way through the publishing jungle. In casa you didn't know it, this inhospitable place is full of hazardous tarpits, deadly snakes, and dangerously swift rivers, to say nothing of the megahordes of pesky insects.

Surviving in the publishing jungle takes guts. It also takes some careful business planning. To those of us who would rather spend our time creating than recalculating, *VisiCalc* and the other spreadsheet programs it has inspired have brought new freedoms. Without them the business world would seem an unchartable place. Without *VisiCalc*, *PC* might well have been hopelessly lost in the publishing jungle.

VisiCalc was truly an inspired and powerful concept implemented in an unusually straightforward, simple to use, and, at times, elegant fashion.

An Advonced *VisiCalc* (ratailing for about double the standard version) is soon to be released that will take advantage of the increased processing power of the IBM Personal Computer. I had an opportunity to examina it recently while visiting Software Arts in Boston, and I am impressed by its flaxibility in formatting the appearance of finished spreadsheets. People who use *VisiCalc*-generated charts for management presentations will be axtremely pleased.

Impressive for somewhat diffarent raasons is Microsoft's antry into the spreadsheet arena with *Multiplon*. This program takes advantage of some highly innovative features, including its ability to anticipate user responses and reduce command entry time.

All this personal computing stuff—from RAM cards to spreadsheets—is vary exciting. It's so exciting that I recently spent 3 days at an Atlantic City computer show and never once thought about pulling a slot machine handle.

Meanwhile, back at the cutting edge of the publishing jungle, in your hands you are holding tha first monthly edition of *PC* magazina. At a bewildering pace, *PC* has grown fat and happy in four short issues. Overnight it has become a solid magazina with an abundance of information, many advertisers, and, most important, lots of readers.

As with all start-up publications, we've endured growing pains. Some copies of the second issua ware lost in the mail, and soma apparantly were never mailed at all. This is embarrassing, so we've takan correctiva action by acquiring a new printer and a new mailing service.

Publishing mechanics aside, in the midst of this country's general recession, the personal computing industry is growing by leaps and bounds. If you're discouraged by the percaived slackening in good old Yankee ingenuity, I think you can take heart by examining *PC*'s advertising pages. Personal computers, especially IBM PCs, have generated a huga, new multibillion-dollar industry. This industry already employs thousands, and soon it will employ many more.

The astonishing conclusion of several highly professional projections is that by 1995 the personal computing industry will be bigger than the automobile industry. The publishing jungle isn't so bad after all, especially when you've got an IBM tiger by the tail. */PC*

THIS INHOSPITABLE place is full of hazardous tarpits, deadly snakes, and dangerously swift rivers.

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Save The Cracks

Electronic mail can make our lives 100 percent efficient, but "saving the cracks" can protect our jobs from the threat of becoming an endangered species.

At one successful company in the microcomputer industry an executive calls his job title "crack manager." That title is not intended as commentary on his managerial abilities; it merely describes his responsibility—"to keep things from falling through the cracks."

In general, keeping things from falling through those pesky cracks is a laudable activity; the "crack manager" probably saves his company a lot of grief and money. But I have come to believe that in suitably small doses the cracks do more good than harm. Somewhere beneath the dosage that is toxlc is a dosage that is actually therapeutic. That's important to recognize now, because the increasingly rapid spread of personal computers is making cracks an endangered species. Personal computers, and the communications networks that link them, can help run our daily activities more efficiently, meaning fewer cracks through which to fall.

"Electronic mail" systems, which let you send messages to associates via wires and display screens, offer one example of how the cracks are becoming endangered. Such systems frequently include a "check" or "notify" feature—electronic equivalents of mailing a letter registered or return receipt requested.

The feature lets you check whether your intanded receiver has actually viewed your message on his screen yet; the more elaborate version leaves a "he got it" message in your electronic mailbox the instant your addressee calls up your missive. What's different between the paper and electronic versions of these services is that the electronic ones are much less troublasome and expensiva to use; in some systems they may be automatic.

In most cases, the check or notify features in an electronic mail system offer a beneficial service, or at least offer a measure of satisfaction to the sender while doing no harm to the receiver. But note that they make impossible one of the most oft-employed white lies associated with the

Illustration: Mick Wiggins

exchange of messages: "The letter hasn't come yet," or "I never got the memo."

If you believe it is possible for a lie to be whita, you may regret the loss of ability to resort to one. The usability of many white lies relies on our collective understanding that the systems we use are not perfect—that occasionally it is possible for a letter to be delayed or a memo lost. When we switch to a system that not only has greater reliability but also reports on itself mercilessly, the polite dissembling of white lies is ruled out. We'll never know for sure until they are gone, but it seems to me very likely that the cracks in our systems are a lubricant that helps the engine of our society to function. Take them away and our social engine will seize up solid.

I suggest we design our systems to supply an optimum amount of lubricant rather than trying to aliminate it entirely. (This notion sidesteps the proposition that "programs will always have bugs" and assumes that, at worst, bugs that survive will not result in meaningful cracks.)

I have no idea what the desirable values are; I expect we will discover them by trial and error. But I do suggest we work by the premise: "If the cracks did not exist, we would have to invent them." In other words, a certain, small amount of unreliability should be designed into every program and device. Not too much, of course—just enough.

Let's say, for example, that the user's manual for an electronic mail system tells you that one out of every 10,000 or so message reception reports will be mistaken, and that one out of every 10,000 messages sent will go astray. That would give some credibility to the plaintive, "What memo?" and "Are you sure? . . . I mailed it last Thursday" questions.

By adjusting the error probability, we can control the amount of disbelief the white lies will inspire, and thus restrict their use to situations of appropriate gravity. Saving some of the cracks means businesses will have to decide the ralative values of collecting every penny dua them, versus customer goodwill from the knowledge that every once in a while a break in their favor may occur. Perhaps wa may one day see advertising similar to that seen along the Las Vegas Strip—"Use Exxon's credit card—with the best odds that we'll screw up the bill in your favor."

For the sake of social prosperity, perhaps investigative agencies ought to give up their quest for perfection and design in a one-in-a-million (or whataver) chance that a suspect's fingerprints will not cause the computer to reveal he is wanted in six states. After all, there is some evidenca that the anonymity provided by the now-gone frontier allowed ne'er-do-wells to reform and later make major contributions to society. In some small way this approach would recreata the frontier electronically.

As computer power becomes ever more accessible and widely employed, thanks to the personal computer phenomenon, we will have to give more careful attention to which cracks we want or naed to conserve. "Crack management" may one day become a responsibility for seeing that enough things do fall through the cracks.

The rule we all—and programmers in particular—ought to keep in mind is a variation on an old nursery school saying: "Step on all the cracks and break society's back." */PC*

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PCommuniques

A compendium of facts, news, opinions, gossip, inside intelligence, speculation, and forecasts about IBM Personal Computers.

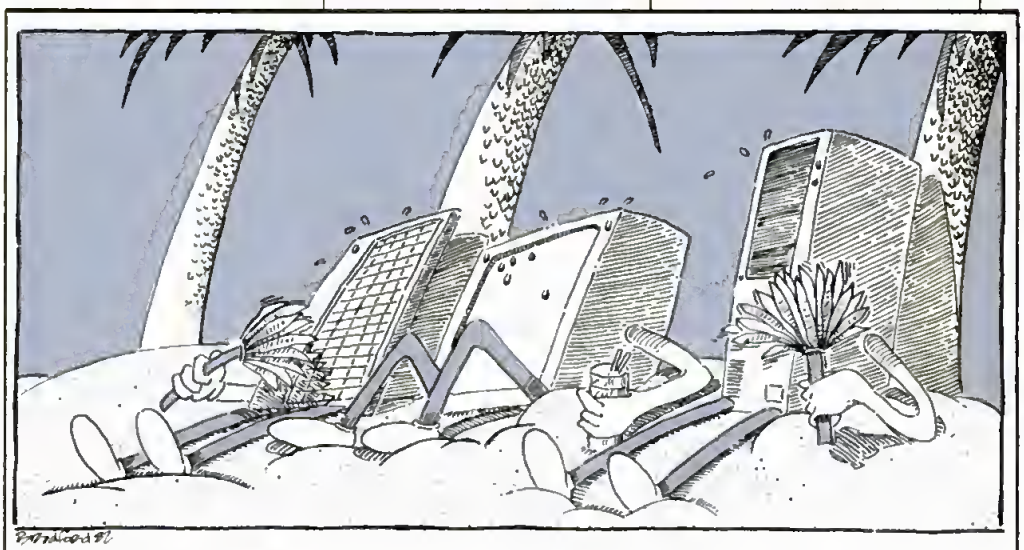
PC Dealer Network: Growing or Shrinking?

IBM has added at least 60 independent dealars to its list of vendors for the PC. Other dealers may apply to sell the PC, but there is no guarantee they will get the nod, even if they meet IBM's requirements, which include having a technicien end repair facilities available, and sending salespeople to special training classes for the PC. The IBM staff person in charge of dealer relations is David Gage (305/998-6009) at IBM's Boca Raton offices.

Rumors are that IBM will not renew its daalar contract with ComputerLand when that agreement expires in August. Our sources cite unsatisfectory customer relations and follow-up among the reesons for IBM's chenge of heart. Individual stores of the ComputerLand chain may still be permitted to sell the PC, our sources report, so long as they meet IBM dealer requirements.

IBM PC 64K Memory Expansion Board Price Reduced

The price of the IBM Personal Computer 64K Memory Expansion Board Option was reduced to $350 at IBM Product Centers—o *reduction of $190.* The price may very et other euthorized IBM Personel Computer dealers.



Keeping Cool

Summer reminds us that everything can get too warm, but various solutions for this condition exist. One that is not appropriate for the PC is taking off its cover. (Keeping it out of direct sunlight is a must, however.) If temperatures in the computer's operating environment are too warm—inside or outside the machine—it could behave strangaly. The best solution to this problem is to turn off the computer and let its circuits cool down. Removing the cover might help temporarily, but operating the computer without the cover defeats a major aspect of its design—the Vanturi effect, a principle of physics by which air tends to speed up, cool down, and then absorb heat when moving through small, enclosed spaces.

Specifically, the PC has a row of narrow vertical vents on the front of the computer next to the disk drive slots, and a larger, hiddan vant under the front lip of the machine, which runs naarly its full width. In combination with the PC's internel fan, these openings bring air into the computer, where the interior is designed to take advantage of the Venturi effect, so thet the stream of air passing over the circuits absorbs heat from them. You can verify this process by plecing your hand over the circular opening et the back of the machine, whera the air comes out; you'll find that this air is surprisingly warm.

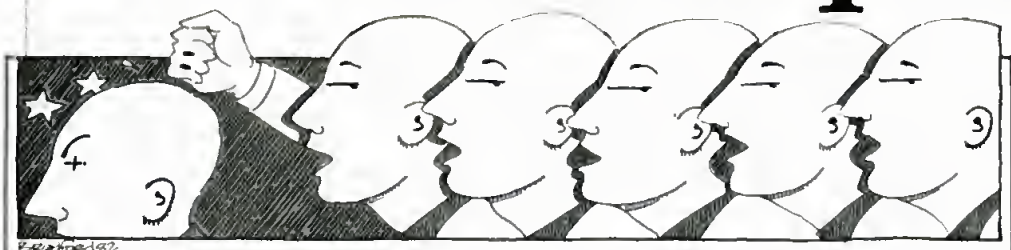
The Venturi effect is named after Italian physicist G. B. Venturi (1748-1822), whose pioneering work led to the development of measurement techniques for the flow of air and liquids. The latter-dey scientist who described the PC's use of this principle to us prefers to remain enonymous, but we like to think of him as Deap Tech.

Who's Asking? Who's Not Talking?

Various PC owners have reported being interviewed by a telephone survey company regarding their use of the computer. Some owners have been called more than once by tha Midwestern-based survey firm, which apparently has baen employed by IBM, although we have not been able to confirm this. The questions esked by the survey-takers include the details of the owner's complete system, what perts of it are IBM-made and what parts come from independent manufacturers, how the user likes the performance of the equipment, what he or she uses the computer for, and how much money the PCer makes.

All this sounds like useful marketing informetion for whatever firm commissioned the survey. If IBM is indeed behind this effort, how unfortunate that its coffers can efford to have someona ask e half-hour's worth of questions of PC owners but can't spring for the 13 cents to send a postcard to notify users that the bugs in DOS and BASIC have been fixed in the versions now available, or to notify independent softwere develoopers that the latest DOS has changes that will affect their programs.

PCommuniques



The Power of Networking

Lest we imply that the manufacturers and dealers aren't listening to their customers, here's an *EasyWriter* saga with a satisfactory ending. One early PC buyer, who was writing a scientific study and planned to finish the project with his new computer and word-processing program, became thoroughly frustrated with the problems presented by the original version of *EasyWriter*. After struggling with it for several months and making regular calls to his local ComputerLand to inquire about a corrected version, this fellow put a notice on The Source's PC bulletin board (reached by typing POST READ IBM when you're logged on this service).

A dozen angry owners replied to his message, and our hero sent copies of these responses to IBM's offices (no reply yet), and took copies to one of the corporation's product centers. A helpful representative there told him that the center was taking back *EasyWriter* and giving full credit to PC owners on a case-by-case basis. Because he hadn't bought his system there, he couldn't receive credit at the IBM store, but he managed to convince someone at the ComputerLand where he did buy it to take back the program and give him full credit toward another software purchase.

The happy ending didn't end there, however: He reported his experience on The Source BB, and other PCers used that example to convince their dealers to give them credit.

P.S. IBM has just announced a new *EasyWriter* release; to get a copy, take the inside front cover of the *EasyWriter* manual (lavender, with 6172310 at the bottom left) to the dealer. This re-release of *EasyWriter* (no connection with *EasyWriter* ff from IUS) probably means no more credits.

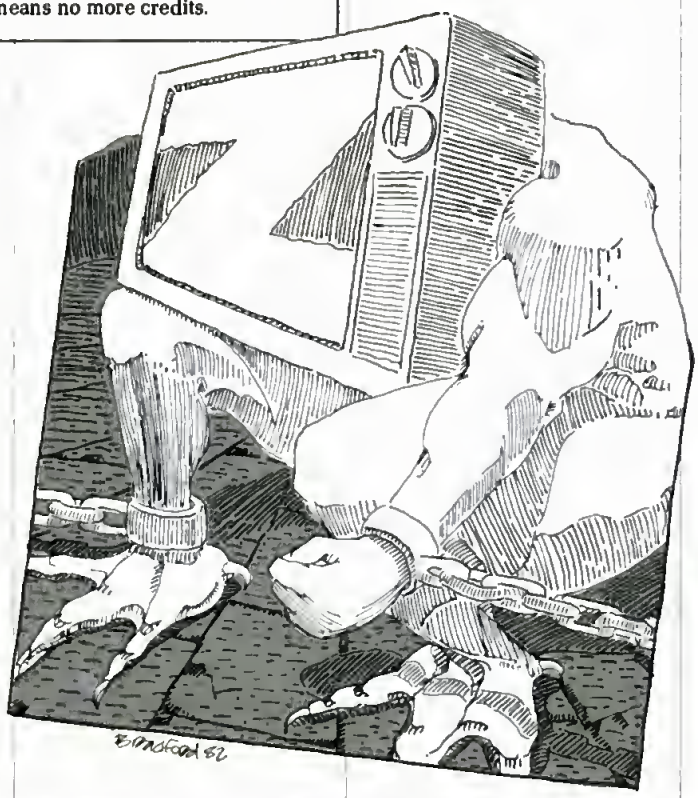
"Dear I-B"

Another enterprising PCer has suggested that IBM establish a computer bulletin board service for personal computer users. Instead of calling the 800 number (which merely provides the name and number of your nearest dealer) or writing to the Boca Raton post office box, PC owners could contact the electronic BB by modem and phone line, and leave their questions and complaints, perhaps with equipment serial numbers if required. Technical or public information staff at IBM could retrieve the questions, solve the problems, and provide answers to users on the bulletin board service. And yes, the service could be called "Dear I-B"—a name that has a familiar ring.

Zork Invades PC

Zork, one of the famed games for personal computers, is now available to PC users. This intricate prose adventure, which takes place in "The Great Underground Empire," is offered by Infocom of Cambridge, Massachusetts, hometown of MIT, where it reputedly was developed (in the artificial intelligence lab). The designers of *Zork* seem to have thought of everything, outwitting players at practically every turn and providing dangerously logical, and often hilarious, responses to players' actions. This is a game you can play for weeks and never finish; you can, however, save your current position to take up where you left off when your strength or wits return. Infocom also has several companions to *Zork*, including *Zork II: The Wizord of Frobozz* and *Deodline*.

If you've played *Zork* or know people who have, you probably also know that many players become *Zork* addicts. One of the most challenging aspects of this game (and its successors) is that your imagination must supply all the visuals. This is a prose game in which you move about in an unseen world, with only your mind's eye and your memory for guides. But hark—here comes the Zork Users Group to the rescue! These folks have risen from the underground empire long enough to publish maps, clues, and blueprints for the Infocom games. For clues to their clues, write the Zork Users Group at P.O. Box 20923, Milwaukee, WI 53220; for the games, contact Infocom, 55 Wheeler St., Cambridge, MA 02138, or check with your dealer.



"The programmer, like the poet, works only slightly removed from pure thought-stuff. He builds castles in the air, from air, creating by exertion of the imagination."

—Frederick P. Brooks Jr.
The Mythical Man-Month: Essays on Software Engineering

PC Greeting Card

Do you know someone who has a PC and has something else to celebrate as well? Or is one of your friends about to get a PC? Why not send that

person a greeting card on disk? You can use your PC to create an appropriate message, store the congratulations or condolences on disk, and delivar a plug-in greating to your friend. Imagine the possibilities: cards that play "Happy Birthday" and show a graphics cake with just the right number of candles; wedding or birth announcemants that play an appropriate tune and suggest the right gift; special stories for kids that include them as characters in the story; a Christmas card with the year's naws and a chorus of "Jingle Bells"; and a welcome-to-computing card that presents a personal message and a selection of games and melodies. With ideas like these, can Hallmark be far behind?

Diagnostic Dilemma

A number of PC owners have documented a problem with the computer's user diagnostics program. It seems that when the PCer runs the diagnostics for the keyboard in the multiple-check mode (one of the options of the diagnostics program), the message "Keyboard Error 301" appears on the screen some of the time, but not always. (Ona user timed his error-message rate at one out of five passes of the diagnostic test.) When these users consulted their dealers, they were told that no problems could be found in thair keyboards. One dealer called IBM and was told that "it was probably a softwara problem."

Another user bought an independent supplier's memory expansion board also containing an RS-232 port. His PC diagnostics program indicated a problem with the port, though a dealer informed him that this was again a software problem. The board and port have worked perfectly.

Our correspondents were able to document their software problams by craating a disk that logged their errors or printing the screen's contents when an error message appeared. Perhaps every PC owner who has encountered the same diagnostics dilemma could produce a printout of the errors and send them to IBM's Boca Raton addrass (P.O. Box 1328, Boca Raton, FL 33432), along with a copy of the complaint/suggestion form included at the back of the operations manual. Include your address and phone number, and—who knows?—you may get some reaction, or even a patch, from Big Blue.

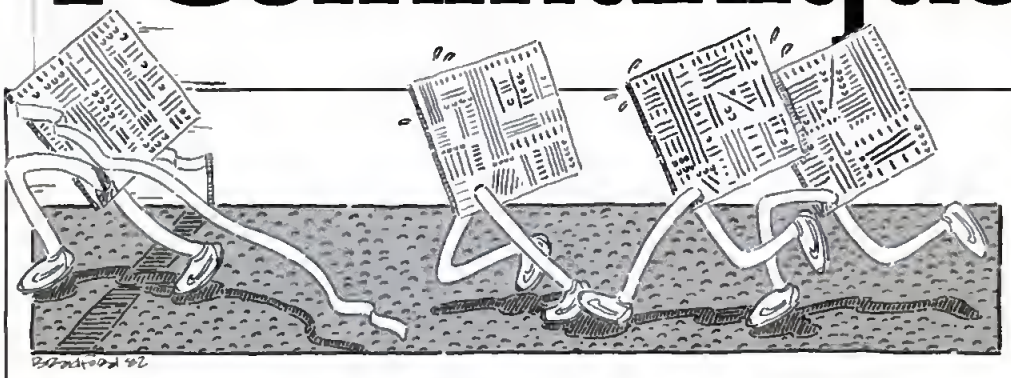
PC Emulates Corvus Concept

The Corvus Concept (PCommuniques, *PC* June/July) features a versatila display screen that can be placed vertically or horizontally. The text or graphics on the screen are oriented to the screen's position by the flip of a switch. Now, in an unprecedented move, one PCer has coaxed the monochrome display of his PC to read up and down or side to side. This new man-machine interface may represent a breakthrough for all computer users who have been bothered by eyestrain or backaches from sitting in one position too long while computing. Our editor's solution to advanced technology includes a shift from right to laft whenever one set of musclas gets stiff. Think what it could do for his waistline!

With God on Our Side

As a new twist to an old theme, Bible Research Systems of Austin, Texas has unveiled *"THE WORD processor."* It contains the entire King James Version of the Bible on eight floppy disks. *PC* owners will hava to wait. Like the serpent in Genesis, the company's initial strategy is focused on the Apple.

PCommuniques



Number-Crunching Chip for PC

Many PC owners and prospective owners hava inquired about tha possible inclusion of Intel's 8087 mathematics chip, which crunches numbars with amazing speed and can be used in conjunction with the 8088 CPU. An empty socket in the appropriate spot in the PC has led to much speculation (in these pages end elsewhere) that IBM intanded to offer the 8087 as an option or simply to include it. As yet, IBM has not announced any intentions for tha math chip, but inside sources suggest that it may ba part of the much-discussed PC 2.

Not content to wait for IBM to utilize the 8087, however, South Coast Data Sciences of Costa Mesa, California now offers e matched set of 8087 and 8088 Intel chips and software that will utilize the 8087 for mathamatical applications. This product, called *Moth Moster*, includes the two chips (the new 8088 will replace the ona that comes in the PC, because Intel notes that matchad chips should be used to avoid any problems with synchronization), a disk with the special software developed by the firm, and complete instructions for installing the new chips. The price for *Moth Moster* is $450, which may saem high until you taka into account the price of the 8087 chip alone—$223.90. (The firm notes that if the price of this chip comes down, the price of *Moth Moster* will be reduced by the sama amount.)

Moth Moster is intended primarily for programmers and softwere developers, beceuse its softwere support programs are written in IBM FORTRAN, COBOL, Pescal, BASIC and essembly language. Specialists at SCDS can configure other programs to work with tha chip set; howaver, if you wanted to usa the 8087 chip with *VisiCalc* or accounting software, for example, you could contact the firm to arrange for this service.

The Book Biz

Elsewhere in this issue you'll find reports from the National Computer Conference—ona of the big, bizarre gatherings of the computer world. But *PCommuniques* also had spies at this summar's big, bizarre book event, the American Bookseller's Association convention at Disneyland (next door, actually, but most of the convantion-goers dividad their time betwaan Mickey Mouse and Random House). Although tha book business is not faring too wall in general, according to most observers at tha convention, computer books ara booming. And PC books are blossoming in all quarters—established microcomputer specialist publishers and traditional Eastern houses alika.

Among the fall titles announced at the convention were Sybex's *BASIC Exercises for the IBM Personol Computer*, Reston Publishing's *Using the IBM Personol Computer*, several new volumes on *VisiColc* and *SuperColc*, and a nifty little series of *Progromming Pocket Guides* (in colorful spiral-bound, stand-up notebooks) from Addison-Wesley. At least two publishers will issue microcomputer calendars for 1983 (including one assembled by our own David Bunnall for Harbor Publishing), and a half-dozen publishing firms are now packaging disks with their books or simply adding software to their product line.

Four New Computers Can Use PC Software

At least four major computer firms heve announced new machines that will be software compatible with tha PC. Two wall-established microcomputer makers, Vector Graphic and North Star, heve introduced dual-processor computers that utiliza the Z-80 and 8088 CPUs. The Vector Graphic mechine, named the Vector 4, was planned with IBM compatibility in mind; its standard opereting system is a version of CP/M that can use the 8088 chip as well as running existing CP/M programs, and Vector offers MS DOS (identicel to PC DOS) as an optional disk oparating systam. North Star's new Advantage 8/16 can run MS DOS and will accommodete CP/M-86 in the futura. In addition, e conversion utility available with the new machine can convert programs or date from PC disks to the North Star formet.

In its first wave of announced microcomputers, Digital Equipment Corporation hes introduced the Reinbow 100, another Z-80/8088 mechine that utilizes a double-threat DOS called CP/M-88/80. This micro—from a company known for its minis and mainframes—will thus be able to use software written for either of the CP/M operating systems.

Finally, one of the Japanese giants has entered the 8088 fray: Hitachi has introduced its forthcoming personal computer, to be available later this year in the United States. This machine will be able to use both MS DOS and CP/M-88.

PCommuniques Pays

Do you have news, gossip, or unusual computer tales for *PCommuniques*? We will pay up to $50 for each submission used. You must include your name, address, and telephone number with the item. We will preserve your anonymity if you wish. All submissions become the property of PC and are subject to editing. Our *User-to-User* section also publishes and pays for readers' submissions; this section features tips, problem solutions, and short programs or routines. Please address submissions to the appropriate department—*PCommuniques* or *User-to-User*—at PC magazine, 1528 Irving St., San Francisco, CA 94122.

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Illustration: Linda Harrison

An Interview With VisiCalc Entrepreneur Daniel Fylstra

A behind the scenes look at the evolution of VisiCorp.

When Daniel Bricklin and Robert Frankston needed help to market their newly created spreadsheet program, they approached the largest software distributor they could find. That turned out to be a one-person company run by Daniel Fylstra, a former fellow graduate student at the Harvard Business School who was selling MicroChess from his Cambridge, Massachusetts apartment. Four years later, Fylstra's company, Personal Software, has evolved in name and stature to VisiCorp, one of the computer industry's largest and most successful software companies. A long way from its roots, VisiCorp now employs more than 100 people from a sprawling headquarters on the outskirts of San Jose, California.

VisiCalc, which was designed to run on a 24K Apple, now runs on more than a dozen machines, including the IBM Personal Computer. VisiCorp is responsible for documentation, sales, and marketing of the product, while Software Arts maintains the program itself. Fylstra's name appears on the by-line of some Atari and Apple versions of the VisiCalc manual.

Although Fylstra built his empire on VisiCalc, he sees it as only the beginning. His company, now engaged in research, development, and in-house programming, has already released an entire "Visi-series" of companion products and plans to develop new generations of microcomputer software.

We spent an hour with Fylstra inside one of the many glass-enclosed conference rooms encircling VisiCorp's labyrinth of office cubicles. Knowing how quickly Fylstra's company has grown since its humble beginnings, we couldn't resist beginning the interview with his reflections on the past 4 years.

PC: When you moved to California from Massachusetts, did you have any idea success was going to spring up in such a fashion?

Fylstra: I couldn't have spelled out all the specifics, but I felt the potential was there. It happened very quickly.

PC: By most standards you're still a young man, but you're a veteran in this industry. What changes have you seen since you started selling VisiCalc out of your Cambridge apartment about 3 years ago?

Fylstra: It has been about 4 years since VisiCalc's development began. The whole industry has grown up from a hands-on, cottage industry to a serious business with professionally run companies. We've certainly gotten the attention of Wall Street, the business community, and the American public.

PC: VisiCorp has done very well for itself, while others have withered on the vine. What, besides a good product, does it take to succeed?

Fylstra: The companies that succeeded were the ones that professionalized their management, ran themselves like businesses, and brought in the best kind of help they could get. They have brought in people who understood their markets, people who really understood what the applications are and what the customers want. Many less successful companies had a lot of grand ideas but were very shotgun in their approach. Sooner or later the marketplace becomes competitive, and if you haven't dealt with the issues that have put you in a strong position, it is no longer an easy game.

PC: What advice would you give to a talented software author who has a bright idea?

Fylstra: If it is someone with a good product design and the programming skills to

build the first one, I would advise him or her to go to an established company. That can provide several things. You need feedback as to whether the bright idea is going to be aimed at some kind of market, and whether there are customers who want the product. Many bright ideas don't fit any market.

Second, any program that becomes e serious product doesn't just stop with the first Implementation. In terms of pure man-years or effort, and dollars expended, you will spend far more if it is successful. Costs include converting it to run on new machines, upgrading it, adding support as the hardware changes, new peripherals, printers, and disks. This is just on the development side—not to mention the investment you have to make in technical support, documentation, end sales training for dealers.

If you go alone, you have to decide you are going to undertake all these things and build a real business, in which case it is very difficult to get another bright idea and capitalize on it again. The other alternative is to team up with someone who has all that machinery in place. Concentration is the name of the game in the software business. Nobody can effectively cover all the bases, particularly as the whole marketplace gets more and more competitive end the demands for excellence increase.

PC: How would you categorize VisiCorp? Is it a publishing house or a reseorch ond development company?

Fylstra: I wouldn't characterize it with either of those terms. It is a full-service solutions provider for a particular market—professionals for desk-top applications. We do whatever is required to perform that full-service function, but we go about it many different ways. We may do things in-house or we may use outside groups. All the key elements—management of the product development process, the marketing effort, product design questions, product line integration—we have to be able to attend to.

The key thing that distinguishes us from other software vendors is that we aim to offer the full range of services people want when they buy a product. If you wander through our offices, you will find software engineers, product designers, quality assurance people, writers, editors, salespeople, and product marketing people. We

VisiCalc Creators Look Forward To Future Glory

The Dynomic Duo: Robert Fronkston and Don Bricklin, creators of VisiCalc, strike ogoin with TK!Solver.

Many great inventions can be traced to one special moment—a flash of insight when the inventor suddenly discovers the key to a problem that has puzzled him or her for days, even years. Just such a moment gave birth to VisiColc, which in turn, many claim, gave momentum to the personal computer by taking it out of the hobbyist market and putting it to work in the business world.

Back in 1978, Dan Bricklin was impatiently sitting in a classroom at Harvard Business School watching his professors writing columns of numbers on a blackboard. They were tediously creeting a mock budget mede more tedious by the fact that every time they changed a number all the numbers derived from it had to be laboriously recalculated. Bricklin suddenly realized that a computer program written for small computers could do all the recalculations automatically. This program would turn the computer screen into an electronic spreadsheet that would make it easy for noncomputer people to do financial planning, analysis, forecasting, end many other releted tesks.

Bricklin took this idea to Robert Frankston, a long-time friend and expert computer progremmer with 13 years experience designing and implementing on-line computer services. Frankston, who has a Master's and an Engineering degree in computer science from M.I.T., had to be nudged into the project, but he finally agreed. Frankston hed been working with Dan Fylstra, a start-up software publisher whose only product was a chess geme. Fylstra agreed to market the Frankston/Bricklin program on a royalty basis. Thus the product, VisiColc, the company that produced it, Software Arts, and to a great extent, the company that marketed it, Personal Software (which later became VisiCorp), were formed in one swoop.

Dan Fylstra's company has capitalized on VisiColc in a very aggressive and successful way. With sales climbing at a rapid rate, VisiCorp has mushroomed to a $30 million business that markets not only VisiColc but the whole "Visi-series," including programs written by people other than Frankston and Bricklin.

Frankston and Bricklin have watched

their company grow rapidly also, even if the growth rate hasn't been as spectacular as VisiCorp's.

Software Arts has decided to forgo the VisiCorp arrangement and market its next major program, *TK!Solver* (TK for Tool Kit). Written for business, engineering, education, or other fields, the program enables the computer user to solve any problem involving mathematics without requiring computer or programming experience. Even the most complex equations can be solved without the use of programmable calculators or custom computer programs. Using cursor controls and commands, which are somewhat familiar to *VisiCalc* users, the user enters the equation for solving the problem followed by the known values. Simply pressing the "!" key solves tha unknown values and therefore the problem.

TK!Solver divides the screen into horizontal windows, one for the equation and another for variables. As you enter the equation in the lower window (such as "Cost=Number/Rate"), the variables are automatically listed in the upper window. If you know any two of the three variables (cost, number, and rate), the computer will figure the third. *TK!Solver* can, of course, solve much more complex problems and formulas can be saved along with prior results. Answars can be displayed as numbers, tables, or graphs, and they can easily be printed out.

TK!Solver has built-in math functions from sine and cosine to net presant value and internal rate of return. It also has built-in tables to convert units of measurement (it will giva you answers in meters, feet, or kilometers). The program supports the DIF file format, developed by Software Arts, so data can be easily interchanged with *VisiCalc* and other programs.

TK!Solver will support application packages similar to *VisiCalc* that contain models to solve particular problems. Models will have preset equations, tables, and values. Softwara Arts will begin marketing *TK!Solver* this fall, and the first machine it is scheduled to run on is the IBM PC.

PC recently interviewed Dan Bricklin about some of these developments:

PC: According to legend, VisiCalc was created in on ottic in the Boston suburb of Arlington. Is that how it really was?

Bricklin: It's true we were working in an attic, but the attic was remotely connected to a very large computer system. It wasn't done during weekends, but during 80-hour work weeks by Bob Frankston, whose hourly rate was relatively high. We may have started as a cottage industry, but we weren't cottaga for very long.

PC: Did you have any idea how successful VisiCalc would be?

Bricklin: It would have been very presumptuous to assume our program would become one of the best sellers ever.

PC: How did you connect with Dan Fylstra and Personal Software (VisiCorp)?

Bricklin: Personal Software was operating out of a third-floor walk-up near the Harvard Business School. One bedroom was used for distribution and another for business.

PC: After having sold 250,000 copies of VisiCalc, you are again teaming with VisiCorp to sell an advancad VisiCalc.

Bricklin: If you use the original *VisiCalc*, you will be able to use the advanced version with virtually no change. It reads old files, and the old commands work the same. But we've added new commands so you can make a report look exactly the way you want it to look. We've added help commands and many new features.

PC: When we compared VisiCalc to SuperCalc, we noticed that it duplicates mony VisiCalc features while adding its own enhancement. Any comment on this?

Bricklin: *VisiCalc* was originally written for a 24K Apple, and we couldn't even assume it had a disk drive. That's one reason there wasn't a help menu. The advanced version of *VisiCalc* will leave *SuperCalc* in the dust.

PC: What advice would you give someone who has written a program and thinks it will set the world on fire?

Bricklin: Come work for us. If you're a good programmer, it doesn't hurt to have good business people around.

—L.M. & D.B.

do our own manufacturing and quality control. All those functions are important. We train dealers. We conduct seminars in the field. Our afforts are vary balanced and reinforce each other. It has been vary synergistic.

WE AIM to offer the full range of services people want when they buy a product.

PC: Could you give us your impressions of the impact and significance of IBM entering the personal computer market?

Fylstra: It is tha first large-scale, successful example of what I would call a new-generation or new-technology machine, particularly because it offers greater capacity in main memory. Tha architecture of the machine is designed to accommodate mora powerful software systems—mora powerful applications. IBM's involvament indicates that the personal computer business is, in fact, a serious business and that IBM can be expected to try to intagrate uses of tha personal computer with the uses of the other data processing resources that are found in large companies. I would expect IBM's Personal Computer to fit into othar aspects of thair product strategy and to solve more large-scale problems than just tha individual stand-alona applications.

Another aspect of IBM's move is that it draw everyone's attention to legitimize the role of computer stores—the role of independent retailers and the rola of software vendors, such as ourselves. IBM was one of the very first large companies to have the humility to really listen to the market. They did an exceptionally good job of designing a machine that the market wanted, as opposed to what their technology dictated. They listened to existing computer dealers and reflected that in tha design of their machina. It has obviously had a vary strong impact already, and a very positive ona.

PC: Did you consult with IBM in the de-

sign of their machine?

Fylstra: We were involved very early on. I would really credit the design of the machine to IBM. They got input from many places, but they certainly put together the machine.

PC: It is interesting that you started out with MicroChess on the Apple, and here you are on the IBM. What does that say for the transition of the company and the direction for the future?

Fylstra: At that time the machines were so limited in capacity that there wasn't much you could do but demonstrate the capacity of the machine. Our earliest products did that. They met the needs of the people who were exploring the machine.

Very early on we realized the tension between consumer applications and business applications. We made our choice in 1978. We took the cash flow from MicroChess and used it to help finance VisiCalc. Since then we have reinvested a lot of our own margin dollars in those types of products. We no longer have games on our price list.

We have found that the games business was a perfectly fine and profitable business; it was just getting to be small compared to the potential of the desk-top applications. We found that every incremental man-hour of product development time was better spent on desk-top applications, so we made our choice. We are happy we did.

PC: What are some of the things you can tell us about the forthcoming "advanced" VisiCalc?

Fylstra: I have to speak in generalities. We have evolved a concept of two groups of VisiCalc users: One group is the more sophisticated users and may be producers of applications. Then there is a wider group of people who might like to use that application but don't necessarily have the skills to build it. They would like to use income tax, real estate analysis to choose which piece of property to buy, but they don't have the knowledge, the inclination, or the time to go through and construct the model themselves. We want to meet the needs of the people who will be sophisticated users and construct the models. We also want to meet the needs of the people who just want to use them.

You want to give the sophisticated user a number of tools designed to make it possible to build applications, or templates, that are powerful, perform their functions, and yet are easy to use for the second group.

PC: Many people make or supplement their living writing VisiCalc templates. Will the new product encourage that cottage industry?

Fylstra: Yes, we will provide functionality

Forty Ways To Increase Productivity With VisiCalc

1. A CPA/farmer in California compares budgeted and actual expenditures.

2. A professional translator in Texas uses VisiCalc for cost/profitability comparisons, budgeting, and income taxes.

3. A Swiss retail food store manager uses VisiCalc for profit center calculations.

4. A California fast-food engineer does his engineering tabulation and bookkeeping.

5. An Oregon medical laboratory director does his workload calculations and space forecasting.

6. A Texas anesthesiologist calculates gas flows on anesthesia equipment.

7. The president of a New York retail business is using VisiCalc to figure out how he can pay for his personal computer.

8. A Massachusetts student is crunching numbers at Harvard Business School with VisiCalc.

9. An Illinois golf course pro and supervisor uses VisiCalc for payroll, pro shop sales and revenue, meeting room scheduling, club prices, and work schedules.

10. A Michigan real estate developer analyzes building and land development costs, cash flow, budgets, and other projections.

11. A Pennsylvania marketing executive likes the speed and math manipulation capabilities of VisiCalc for his 5-year plan.

12. An accountant in England applies VisiCalc to plan vs. actual calculations, financial models, and management sciences (e.g. queueing theory).

13. A Florida sporting goods retailer uses it for business, economics, and statistics.

14. A South Carolina chemist calculates his chemical formulas.

15. A Norwegian businessman forecasts cash flow and calculates time management.

16. The president of a Massachusetts company uses VisiCalc for "forecasting, planning, and having fun."

17. An Illinois artist has put all his personal accounting and financial record keeping on computer.

18. A Texas dentist does his accounting, day sheet, checkbook, and income tax.

19. The vice president of a Mexican engineering firm does forecasting, inventory tracking, and budgeting.

20. An Alaskan oil field engineer has automated his forecasting and planning.

21. A U.S. Dept. of Labor economist does simple regression analysis leading and lagging the independent variables.

22. A U.S. Coast Guard officer stationed in Hawaii forecasts Coast Guard resources and does his personal budget.

23. A Kentucky police officer has put his family budget on VisiCalc.

24. The president of a Georgia investment consulting firm does investment and economic manipulations.

25. The manager of facilities engineering for a major North Carolina furniture manufacturing corporation monitors a corporate energy program and does scheduling and financial projections.

26. The circulation department manager of an Illinois university keeps weekly, monthly, and yearly book circulation statistics.

27. An Ohio aeronautical engineering program manager tracks the finances of contracts and his home budget.

28. A Canadian pharmaceuticals quality control manager analyses efficiencies.

29. The president of an Oklahoma computer company does financial modeling and analysis.

30. A Michigan cattle rancher does "quite a bit of worksheet record keeping."

31. A landscaper in Oregon has automated his bid calculations, job costing, and labor management.

MORE THAN 50 percent of all dealers are now offering VisiCalc training classes.

in the product that will greatly assist people in that kind of activity. There will be internal use of models: The sales manager might compere the skeletal sales forecast and then have a regional manager fill it in. There will also be an extra commercial kind of template usage in which people actually sell templates or offer templates along with consulting services. We are trying to encouraga the people who are doing that kind of thing, and we are doing a little bit ourselves.

PC: Will people who have the existing version of VisiCalc be able to upgrade to the advanced version?

Fylstra: I can't be exact about how wa will handle anything like that, but you can be sure we will take cara of our customers.

PC: What would happen to the local Chevy dealer if somebody walked in with a problem and got: "Here is o number to call in Detroit." That's what happens in computer stores.

Fylstra: That is an interesting question. Keep in mind the desire for service and the cost of service. I think you'll see that service will become available for those who are willing to pay for it. That is already true at some of the better computer stores. If you are willing to pay for it—if your application justifies the real cost of a certain level of service and support—you can oftan buy a service contract. You get on-sight replacement, service, or maintenance. You can also obtain, at least in some places, direct consulting services, application help, and training classes. More than 50 percent of all dealers are now offering *VisiCalc* training classes.

Through the technology, packaging, and design of the product, personal computers have been abla to deliver computing power for applications of limited utility. If the value of an application is $10,000, there is no way you can justify a $25,000 minicomputer to do it. But a $5,000 desktop computer really does pay. The secret of the success of personal computers is that they are opening up a new range of applications that the technology just didn't reach before bacause it wesn't cost-justified. The service and support that goes along with those kinds of products has to be perfectly sized for the scale of application.

You get into problems whan a vandor promises some kind of support that is different from what is economically justified, or when a customer comes to expect some leval of support that is not justified.

PC: If you are in the middle of nowhere using VisiCalc, and you can't figure it out from the manuol, there may simply be no one to sell you thot service, and the only ploce you con coll is VisiCorp.

Fylstra: Absolutely. We hava a very active technical support group that handlas both dealers and end users. We handle thousands of calls each week and measura our own responsiveness on those calls. We require our own people to respond to and resolva 90 percent of all phone calls within 24 hours and a comparable number of letters within 48 hours. We are constantly sampling customer satisfaction with that talephone support servica. We have worked very hard to maka that operation efficient. We have become very good at answering many questions in a very short time. We also hava a lot of stock answers to typical questions.

PC: Do you also support customers who bought VisiCalc from IBM?

Fylstra: Yes, absolutely. We not only support the product we sell through dealars, we support the product we sell through IBM.

I WOULD expect IBM's Personal Computer to solve more large-scale problems than just the individual stand-alone applications.

PC: Will you be able to continue to do it for free?

Fylstra: Yas. For tha level of tachnical support we offar, we can presantly anvision that service for free. We do have peopla occasionally call up and say, "I just bought this end I hevan't read tha manual yat, and I have this budget to do for tomorrow morning. What do I do?" They expect us to lead them through it. We explain that we can't really afford to provide that kind of support, and people are generally very reasonable.

PC: One market area thot you haven't addressed so far is word-processing. Is that an area you plan to address in the future?

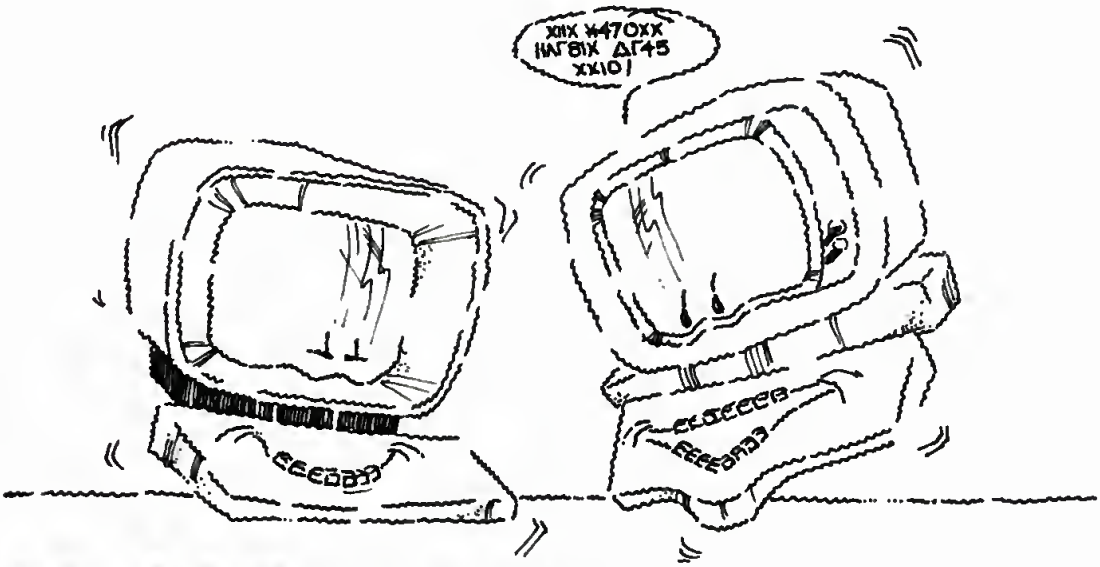
Fylstra: Yes.

PC: Will there soon be a word-processor

32. A California computer store owner uses VisiCalc to increase sales of personal computers.
33. The chief executive officer of a Pennsylvania coal mining company does his financial business accounting.
34. A California physician keeps track of the daily patient census and nursing staffing patterns.
35. A Delaware portfolio manager does his stock analysis and management with VisiCalc.
36. The president of a Utah retail firm uses VisiCalc to do pro formas and "to hit" scores for Dungeons and Dragons.
37. An Illinois executive pilot does operating cost projections for various aircraft.
38. A Connecticut film producer applies VisiCalc to film production inventory keeping and insurance analysis.
39. A New York TV director of research calculetes rating trands, averages, and cumulative audiances.
40. An Arizona research psychologist analyzes data formats, personal finances, and investments.

Excerpted from 101 Ways to Use VisiCalc Software, VisiCorp (formerly Personal Software Inc.), Sunnyvale, California.

"WHAT DID ONE COMPUTER SAY TO THE OTHER COMPUTER?"



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thot *will* integrate with the Visi series?

Fylstra: Yes. No comments as to when and how, but it is en important area—one of several important areas. Communications is a very important area to us.

PC: Whot are your plons in the communi-cotions oreo?

Fylstra: We ere looking at several areas, terminel emuletion being only one. We ere looking et the whole problem of how personal computers ought to interconnect and

I THINK copying becomes a problem when proximity of use occurs.

what kinds of applicetion functions can be performed effectively by personal computars that might be local to eacb other, within e department, or where high-speed communicetion is needed that is geographicelly ramote. We ere elso looking et how personal computers might interconnect with other computers—minicomputers end meinframe computers—and what kinds of epplications would be possible if you had that kind of intarconnect capability. Wa are also very concarned ebout the way personal computers might be usefully interconnected to public data services.

PC: Whot's your response to the many imitotions of VisiCalc?

Fylstra: We don't view it es some kind of war with this or that particular featura. It is much more importent to undarstand where things ere going in terms of typical kinds of usage, to meet those needs, to actually extend the utility and tha product to people who otherwise wouldn't get involved. We view the product es e mix of elements, including the software, documentation, technical support, and other kinds of services.

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PC: One of the features we like about SuperCalc is that it isn't copy protected and it can be copied onto a hard disk. VisiCalc cannot be copied. Aren't you punishing the legitimate user in order to get at the illegitimate pirate?

Fylstra: Are you asking about copy protection or hard disk support?

PC: Both.

Fylstra: Lat ma talk a bit about hard disk support. We view the trend toward hard disks as an important ona. We think it will be important, and we intend to support hard disks, and do it right. Doing it right is a bigger problem than copying tha floppy image on hard disk and handling floppy-sized files on tha disk.

PC: How will you solve the problem?

Fylstra: Several kinds of things; some have to do with whether the application wants to make use of files that are larger than would otharwise be on a floppy. You might have to provida for commands in the software to access parts of a disk or organiza data on a disk that just might not arise in the case of the floppy. Probably more important is the issue of sharing hard disks—allowing people to share data files without intarlocking between one person who is writing the file and the other who is trying to read it. There may also be issues of who is authorized to get into it. Also how people are connacted to the hard disk. Thare are different kinds of servicas you would want to provide. Some people are connected over a local natwork and others have a direct connection.

PC: Whot about copy protection?

Fylstra: We don't like it, and we hate the inconvanianca as much as the customers do. It is a real nuisance for us to try to devalop all the methods, defend against tha various pirating mathods, and administar the whole program of back-up and replacemant disks. It is something on which we certainly don't make money. We do it because our experianca has been better that way. If wa did not deal with copy protection and left things unprotected, we might have to raise prices or daliver less functionality. The real answer lies in better means of copy protection that don't have the disadvantages of tha current ones. I don't hava graat optimism for licensing arrangements.

An effective, unobtrusive method of copy protection is in everybody's interest.

PC: This is a different market than the Apple or Radio Shack. Breaking VisiCalc's copy protection was sort of a rite of passage in some clubs. Given IBM's market, do you think it will still be a problem?

Fylstra: It could be. This is something we are concerned about. Wa have increasing usaga of our products in dapartmants of large companies, and cartainly without the intant or sanction of the large company, copying and pirating literally does take placa between those machines. It is so convenient and natural to take your disk out and walk over to the next machine and put it in. All by itself, this is illegally copying softwara.

PC: You're not talking about copying the disks—just moving it from one machine to another?

Fylstra: Right. That's a violation of the copyright laws as well as our licensing agreement. It is only a small step from there to finding a way to copy the program disk for convenience. I think people often do it without realizing it is illegal. It could get them and their company into trouble. I think copying becomas a problem when proximity of usa occurs. The more computers there are, the more proximity there is going to be.

PC: Do you think piroting would ceose if prices were lowered?

Fylstra: In the old days, when we sold MicroChess for $19.95, it was copied as much as other products. I don't think there really is a floor. It is a matter of convenience and people not really thinking about what is legitimate and what isn't. You have to solve the problem of sharing, such as when you have a hard disk or ara on a local network. It becomes convenient to move things around. Wa naed a form of protection. I think protection is the simplest answer. Restrictive licensing would be the alternative, but it would be much more complex.

PC: For the sake of clority, whot if a company hos 100 different personal computers, they buy one copy of VisiCalc, and they use it on different machines?

Fylstra: They are breaking the copyright laws under our licensing agraement.

PC: How are they breaking the copyright laws?

Fylstra: Thay ara making copies on each machine. A copy is in memory. Copies in memory under the copyright law are just like copies on a disketta. It's just a different storage medium. Our license agreement, which people accept when thay buy the package, restricts usage to one machina.

PC: Have you ever prosecuted?

Fylstra: We have some litigation in process that I would rather not discuss until it is complete.

PC: Let's change the question. Do you think legal remedies are going to be effective?

Fylstra: Yes. They are certainly going to have an impact, and we are using them. But people don't really want to have a world in which there are battles over morality and legality, lawsuits, and so on. People want a situation in which it is convenient and easy to use a product. An effective, unobtrusive method of copy protection is in everybody's interest. I think unobtrusive copy protection will ultimately have a favorable impact on prices.

PC: Do you think electronics will get better and better?

Fylstra: Yes. I think the changes in tha economic policy on taxation will have a very favorable impact. It will be vary good not

only for the personal computer industry and for industry in general but for peopla at larga. I really think we will see a definite stimulus to innovations as a rasult of some of the economic and tax law changes. We are seeing that in our own company, in the motivation of our own people; we have incentive stock options for all our employees, and so on. We certainly see the impact on investmant and in increased competitiveness of American business. We are very optimistic about the rest of the decade.

PC: Are the Jopanese going to be competitors in the softwore business?

Fylstra: I am sure they will be in the long run. We just aim to be better competitors.

PC: Whot kind of o heod start do we have on softwore?

Fylstra: It is hard for me to say, but I think several years. They face the same problem that any country or company faces going into another market in which your product is so closely tied to tha needs of your customer and to the practices, customs, and terminology of the business. The business market for computers in Japan is very different. You really don't have the kind of desk-top productivity applications you have here. Most of the Japanese market is still kind of a home hobbyist type market. There is a small business accounting market, but you just don't see the kind of thing you do here. Language barriers and different business practices also exist. I think we are leaders in terms of pure innovation, in terms of really exploring things and coming up with better ways to do things. What we can't afford to do is be complacent. We want to be identified with desk-top applications and personal computers. We want people to think Visi. */PC*

WE certainly see the impact on investment and in increased competitiveness of American business.

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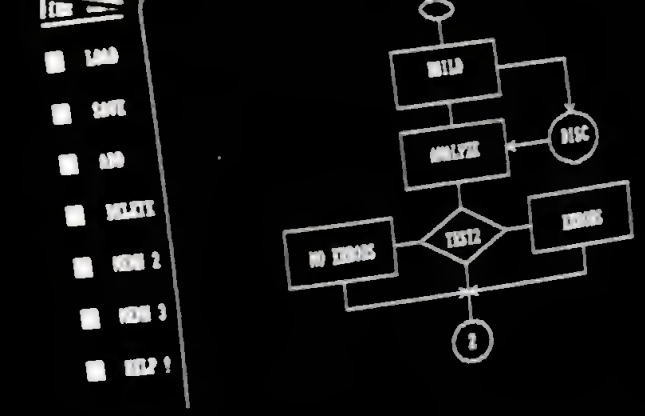

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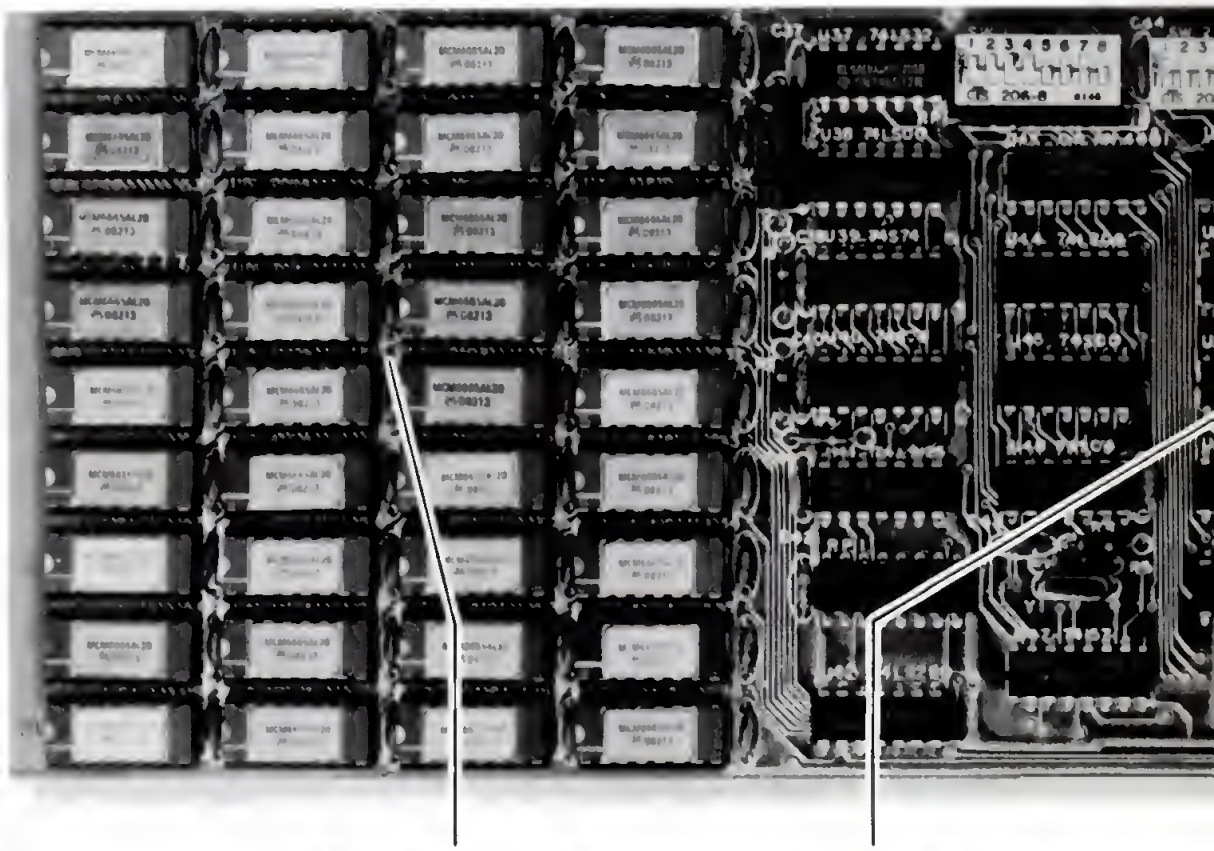

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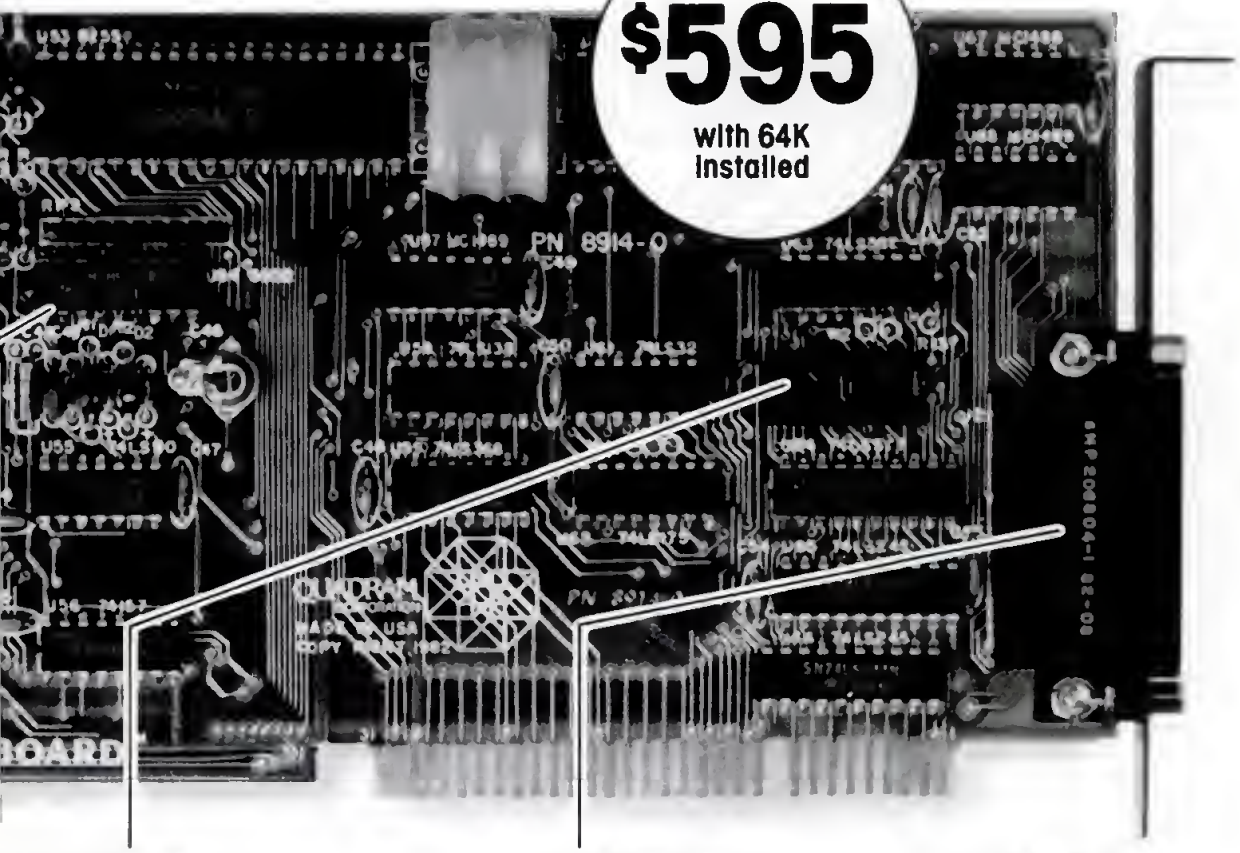

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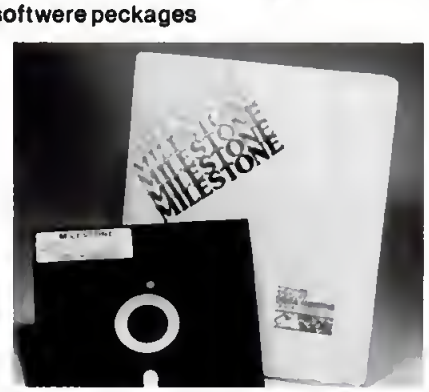

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IBM's special ad campaign to promote volume purchases at a discounted price has generated a rage of PC sales and quantity buying.

THE MORE PCs THE MERRIER

Pilot installations that could lead to large-volume orders for the IBM Personal Computer are popping up like flowers in summertime in a variety of industries.

Insurance and accounting companies, colleges and universities, manufacturing companies, and petroleum companies are among initial users showing a strong interest in volume purchases, said Patrick J. Zilvitis, manager of personal computer marketing at IBM's National Accounts Division (NAD). NAD, which markets all IBM products to large accounts, has a direct-marketing team dedicated to any prospective PC sale involving 20 or more machines. The sales force is armed with a volume purchase price reduction plan that provides for a 5 percent discount for orders of 20 to 49 PCs, 10 percent for 50 to 149 machines, and 15 percent for quantities in excess of 150. A similar discount schedule exists for program products.

For very large volumes, in the hundreds or thousands, IBM will make "special bids," which, while unspecified, provide for even larger price reductions.

"We see the PC as one of the key, intelligent work stations for our accounts," Mr. Zilvitis said in an interview. Its asynchronous communications capability permits access to host systems and other information sources, he noted. Also, IBM has announced its intention to provide the PC with a subset of full 3270 emulation capability.

Demonstrations and Education

After the PC was announced last August, the direct-marketing team's initial mission was educational—giving demonstrations, gathering information from potential customers on user needs, and spreading the word about the machine's capabilities and volume price reductions.

FOR very large volumes, in the hundreds or thousands, IBM will make "special bids."

Today, those demonstrations and discussions have resulted in numerous pilot installations in a large cross-section of account types. "We see a lot of experimenting going on," Mr. Zilvitis said.

Under IBM's volume purchase plan, customers have 12 months to buy the number of machines initially ordered. This allows time for pilot testing and software development.

In addition, NAD provides technical support during the 1-year period via an "800" telephone number to its NAD Customer Assistance Center in Boca Raton, Florida, near IBM's PC headquarters facility.

PCs Sell Insurance

Connecticut Mutual Life Insurance Company of Hartford, Connecticut was one of the first to contract for a large-volume purchase. It is among approximately a dozen insurance firms that have shown a strong interest in the PC.

William E. Dowty, vice president of Connecticut Mutual Life, said his company has signed up for 1,000 PCs, with an initial pilot installation of about 50.

Mr. Dowty sees the machines eventually being used in the company's approximately 90 general sales offices around the nation, which employ about 2,500 agents. Most of the offices now communicate with Hartford headquarters using nonintelligent terminals and leased telephone lines.

While Mr. Dowty expects the PC to save communications costs by operating in dial-up mode, "We're primarily justifying the purchase cost on the basis that the PC will provide our agents with more timely and flexible information that will result in more insurance sales," he said.

Applications will include sales illustrations and policy service. The PC will handle information as a stand-alone, local system to generate sales illustrations, yet be capable of accessing the company's host IBM 3081 processor for updated policyholder records, for example.

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The Connecticut Mutual executive said the IBM PC was selected over competitive systems because it is a 16-bit processor, enabling data to be handled more efficiently than with 8-bit systems; it is attracting good software; and "We believe IBM will provide good support." In addition, he said the company likes the machine's "human factors," such as the display screen and keyboard.

The life insurance company has purchased the standard 64K PC with dual 5¼-inch floppy disks. It is recommending that its agents use a Centronics 353 or Epson printer, however, rather than the IBM dot matrix printer, which Epson manufactures for IBM.

Mr. Dowty said Connecticut Mutual is writing its own software for unique sales applications but is looking to existing vendors for more common applications such as *VisiCalc* or data management programs. In addition, the company has contracted with an outside vendor, whom he did not name, to write some specific application programs.

IBM's Mr. Zilvitis said colleges and universities—particularly those that specialize in high technology—have also shown a strong interest in the PC. Some, he said, hava suggested that they may someday require incoming freshmen to have personal computers, with the cost built into their tuition, collected through lab fees, or paid over time.

Used by Management

One of the marketing team's challenges, he said, has been trying to motivate people in large corporations to invest time to learn how to use the PC. This has been especially difficult at top management levels. However, a number of pilot installations are operating within IBM, as well as at some customer top-management locations. One of IBM's senior financial controllers who happened to have a personal interest in microcomputers uses *VisiCalc* extensively for "what if" kinds of problems, Mr. Zilvitis said. "He told us his productivity has increased to the point at which he couldn't live without tha PC," Mr. Zilvitis added.

The NAD manager of PC marketing said his own staff uses the PC regularly to prepare charts and graphs, among other applications.

IBM routinely declines to name its customers without their prior permission, and frequently is restricted by nondisclosure agreements. The company acknowledged, however, that accounting firms, manufacturing companies, and petroleum companies were among those with initial large-volume potential.

Outside sources said one of the biggest PC customers to date is Arthur Andersen & Company, a large, national accounting, income tax planning, and management information consulting firm.

Arthur Andersen officials declined to discuss details of the agreement, but insiders said the firm presently plans to equip all its U.S. offices with the PC and is currently requiring all its professional personnel to take a 2-day training program in the PC's use. The program covers *VisiCalc*, BASIC, and income tax preparation, sources said.

Mr. Zilvitis said most of the PCs installed for large-volume customers are being used by professionals rather than sec-

Have You Read the Fine Print?

Knowing IBM's terms and conditions.

Before signing the dotted line to purchase IBM Personal Computers in volume quantities, potential customers should be sure they understand carefully worded language in IBM's terms and conditions.

"A customer can order one time, via a Supplement to the Agreement for Purchase of IBM Machines, up to five systems for a pilot, or more under the Volume Purchase Amendment to the Agreement for Purchase of IBM Machines."

"The customer will be charged the unit price for these pilot systems. The customer will have four months from shipment of the pilot systems to sign a Volume Purchase Amendment for any additional quantity. If the customer elects to do this, the pilot system quantity will be included in the additional quantities to determine the volume purchase price reduction percent to be applied to the additional quantities, but no reduction shall apply to the pilot system quantity."

IBM also protects itself from customers who might change their minds with something called a "Settlement Charge." Settlement charges apply for hardware and software ordered, but for which delivery was refused by the customer during the contract period. In the case of hardware, IBM has a Settlement Charge of $50 for system units/keyboards, $20 for the 80 CPS dot matrix printer, and $10 for the monochrome display. For licensed programs in the PC "library" the Settlement Charge is $10 per five licenses, or part thereof, for PC DOS diskette, Microsoft *Adventure*, Asynchronous Communications Support, cassette and diskette versions of *Typing Tutor*, *FACT TRACK*, and *Arithmetic Gomes Sets 1* and 2. All others generally have a Settlement Charge of $10 for each copy of the program.

For both hardware and software, 2 months notice must be given in writing to change a shipment schedule. New shipment dates must fall within the 12-month contract period.

—*Jim Strothmon*

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retaries. Electronic mail is a particularly popular application, he said, for both internal and external message sending.

Two information service networks—The Source, owned by Reader's Digest, and CompuServe Information Service of

MOST OF the PCs installed for large-volume customers are being used by professionals.

Columbus, Ohio—recently started new nationwide electronic mail delivery systems, which can be accessed by the PC as well as by other personal computers.

The Source's 18,000 subscribers, which include a number of businesses, have joined with Western Union's MAILGRAM service. If entered by 4 p.m., MAILGRAMs are virtually guaranteed next-business-day delivery, according to the two companies.

CompuServe, meanwhile, has begun a revamped electronic mail system, called EMAIL, which allows its nearly 25,000 users to send messages to other subscribers via a local telephone call and easy-to-understand entry procedures.

Because IBM's NAD is marketing to large accounts, generally Fortune 100-sized companies, its customers have considerable in-house software expertise, which can be used for PC applications. To date, IBM has not teamed with other hardware or software vendors in making large-volume proposals, other than offering program products from other vendors which IBM routinely markets as part of its standard PC "library."

IBM generally approaches big customers via the PC direct-marketing sales team, coordinating calls with IBM sales representatives that market other products—larger computers and office systems, for example—to those particular customers. Because most are sophisticated users, however, many prospective large-volume customers are considering non-IBM alternatives for add-on memory, disk storage, printers, and other peripheral devices, as well as for program products. */PC*

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Illustration: Burrell Dickey

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EVENTS/DAVID BUNNELL

NCC ROUNDUP

PCs, sweat, and cheers in Houston. Interest in the IBM Personal Computer reaches astronomical proportions at this year's National Computer Conference.

Houston, Texas probably has mora space-age skyscrapers than any city on earth, and they are building more there every day. Fitting place, it would seem, for the granddaddy of computer shows, tha National Computer Confarence, more commonly known as the NCC.

The convention site was tha Astrohall next to the famed Astrodome sports stadium. The convention hall is not very inviting, and the surrounding hotel accommodations are not nearly up to the task of servicing the needs of 100,000 attendaes. As a resuit, many people ware housed as far away as Galveston (45 miles). Many attendees and even some exhibitors commuted by air from Dallas.

The show lasted 4 days—Monday through Thursday. Houston was hot, humid, and at times suffocating. The sprawling floor of the Astrohail with its iow cailings was jammed with some 800 exhibits. To make matters worse, the Astrohall is really three halls laid out lika the spokes of a wagon wheel with juxtaposing seminar rooms and auxiliary halls plus a separate minihall on the other side of a parking lot. Finding your way around this show required the ability to walk and observe while solving the Rubik's Cuba—it was impossible despite a map in the NCC guide.

Rambling and disorganized as it was, the NCC still had its high momants, including lavish parties for both exhibitors and the press. One of the better parties was at a baautiful, huge hacienda, a replica of one in Mexico City. Sponsored by McGraw-Hill, tha party featured flamenco dancers and country bands performing for a PC-estimated throng of 2,500. Tha gulf shrimp and margaritas wera plantiful, along with many othar goodies.

NCC is a big, computer industry celabration, but more important, it is the place where many companies introduce new products. A product introduced at the NCC can get more exposura and industry press coverage than anywhere alse on earth, with the possible exception of the Hanover Computer Faire in West Germany. This year the focus was definitely on personal computars, which were found in abundance on the convention floor.

copyrighted material

NCC ROUNDUP

The introduction of tha IBM Personal Computar has opened the floodgates. An estimated 400 diffarent personal computers ara on the market at this tima, and at laast 150 of tham wera on display at the NCC.

Tha big story for IBM PC owners, however, was the growing industry support for the IBM. In tarms of shaar voluma of software and hardwara options, tha Appla II is still the best-supported personal computer, but tha IBM machina is not far behind. And it is becoming increasingly claar that because of its incraased capacity, it will soon roar past tha Appla II lika a locomotive passing a bicycla.

FINDING your way around this show required the ability to walk and observe while solving the Rubik's Cube.

To demonstrate the scope of this message, *PC* magazine takes you on tha following tour of tha NCC convantion floor.

IBM programmer Pat Smith can't tell PC what her favarite program is.

Practical Peripherals was demanstrating its Universal Hard Disk.

IBM

Situated naar tha axis of tha Astrohall in tha center of tha show floor, the IBM display included tha broad array of IBM offica computers and computing products, including the PC, Datamaster, and Displaywriter. Two parsonel computer systems wara shown: a super systam with two monitors, an Elactrohoma High Resolution monitor, and tha IBM monochrome display. Also on display was a Tecmar expansion chassis with hard disk. Somewhat disappointing, howaver, was the software, which seemed to consist of mostly standard demo programs.

One nice piaca of graphics was a dancing, blua alaphent. According to reliable sourcas, this software was written to poke fun at *Business Week* for having onca said that if IBM entered tha personal computing businass, it would ba like teaching an elephant to dance.

There appeared to ba a continual dem-

onstration of these products by IBM Product Center personnel who took turns doing littla song and danca salas routinas using a hand-hald microphone. Of particular significanca was that tha parson damonstrating tha PC moved right on to tha Displaywriter and tha Datamastar. In othar words, many customars who coma looking for personal computers find that they really naed bigger machines or that they want a combination of equipment.

Also on hand were several IBM technical people to answar individual quarias. PC interviewed sevaral of them, including Pat Smith, a programmer from Boca Raton, who has worked on tha PC.

PC: What are the most frequent questions asked by the people at the show?

Smith: What types of softwara do wa have available? How much do differant system configurations cost? And, when we are coming out with new products—to which, of course, we cannot respond. We are also being asked about new products we've recently released.

PC: Are the people you're talking to positive about the machine?

Smith: Most are highly positive. A lot of peopla I've talked to either have machines or they hava friends who have them; most ara anthusiastic.

PC: Have you been involved in the testing of IBM software?

Smith: Yes.

PC: What is your favorite?

Smith: Oh, I can't tell. I don't hava any favorite products.

PC: What are your impressions of Microsoft BASIC?

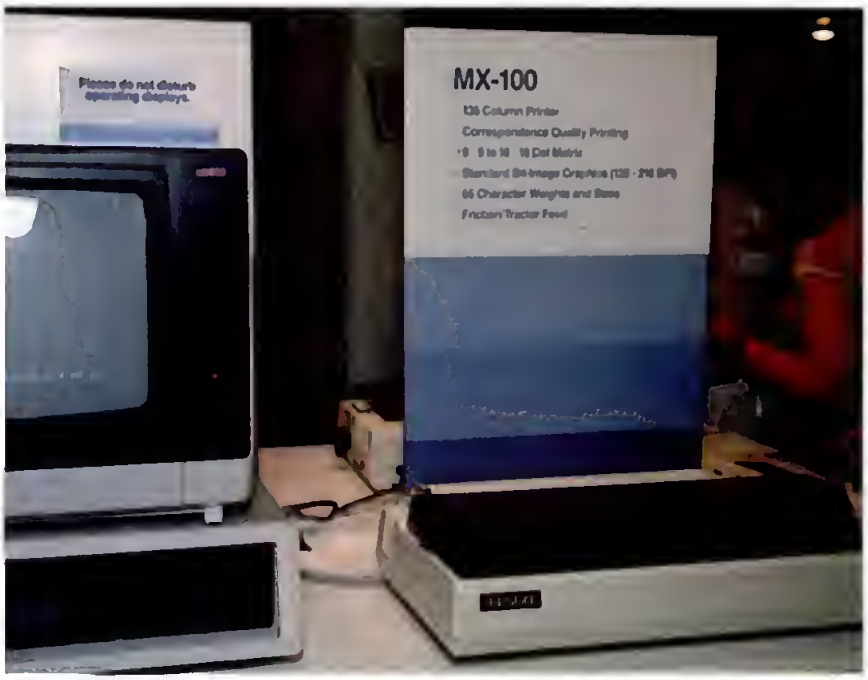
Smith: It is a tremendously powerful language. It is fantastic how easy it is to do graphics.

* * *

PC also intarviewed Lony Jacobs, manager of Product Publishing, IBM, Boca Raton. Jacobs is involved with selecting the programs IBM will publish.

PC: Do you hava any odvice for potential software outhors?

Jacobs: Many softwara authors who submit programs to us haven't studiad tha market well anough. They submit incomplete packages. They need to do soma



For those who need extra-wide printouts, Epson offers this 136-column printer.

Universal Data Systems introduced some new low-cost modems.

NCC ROUNDUP

I PAINTINGS CREATED
Y "SIDEWALK SAM"
VILL BE AUCTIONED
T THE FIRST ANNUAL

market research on what's available and see if their own programs measure up before submitting them.

PC: What kinds of programs are you looking for?

Jacobs: Right now it's wide open—we're looking for everything. Maybe in a year or two we will be able to take more specialized programs when the base of software is there, but right now we don't have enough that is good and easy to use.

THE IDEA is based on left brain/ right brain theory, and it reportedly makes programming highly visual and intuitive.

Also of interest was IBM's ergonomic work station furniture that was designed because "there is no such thing as an everage person." The woman demonstrating it was a cese in point—she was over 6 feet tall. The work station table consists of four platforms that can easily be raised or lowered. When your system is set up, you can edjust the height of the keyboard, the display, or the tables on the side. A separate, small table holds your printar. The furniture costs ebout $1,100.

Universal Data Systems

On display et this booth was an IBM PC, communicating with The Source through a new low-cost modem. This piece of equipment consists of a flat, book-like box that can sit under a telephone. At Universal Date Systems' booth we talked with Bob Bringhurst.

PC: Tell us about this modem.

Bringhurst: It's a 212-type modem that has autodieling capability. A lot of software is involved in that, so it does have some intelligence.

PC: Whot is the baud rate?

Bringhurst: This model has a dual baud rate of 1,200/300. This one is running at 1,200; tha retail price is $695.

INSAC Software

Of great interest at INSAC is a shared data base system built eround an Intelligent Database Machine (IDM), which was shown interfaced to three IBM PCs. INSAC Software, Inc. is e subsidiery of Britton-Lee, manufacturer of the IDM. PC interviewed the president of Britton-Lee, David Britton.

PC: Whot is the ideo behind this product?

Britton: PCs are prolifarating all ovar tha country. One problem data processing managers are having is how they are going to deal with this proliferation. People are going to come back to the data processing departmant for help, but they are not going to get any, because PC peopla are different people from data processing people.

What PC people need is some centralized access to a data base. With the small machine we are showing here, you can tie in 16 PCs in a star configuratlon directly to the IDM 200 Database Machine. That gives you data base access of up to 2.5 billion bytes. Everybody connected has lots of storage available, end you can run lots of electronic mail through file structures, communicate between machines, and use the PCs in local mode.

PC: Can you store DOS files on the doto base?

Britton: Absolutely. The system can be ralational or you can use file structures.

PC: Whot does it cost?

Britton: The mechine by itself with a half-megabyte of memory costs about $35,000 bare bones. From there add the memory and intarconnections you need. If you want more than 16 users, we have a larger machine to which you cen directly attach 96 users. This machine starts at $65,000, but on a per port basis you would probably be down to $3,000 a port or less.

Corvus Systems

Corvus Systems' first claim to fame was capturing the largest share of the 5¼- and 8-inch hard disk, mess storage markat for microcomputers. There were two topics of interest here. Topic numbar one was hard disk systems: Corvus has three for the IBM PC—6, 11, end 20 megabyte. These systems are mede to work with DOS. Software includes a linkage program that attaches itself to the diskette-based DOS. These Corvus hard disks are designed

Leading Edge added Pro writer to its growing list of PC products.

Sidewalk Sam drew a lot of ottention painting a Leading Edge elephant.

beautifully, and if they are half as reliable and usable as they look, they must be super. Also available for the PC is a videotape back-up and archive system, called Mirror, that uses a standard video cassette recorder.

Topic number two was a Corvus Omninet interface for the IBM PC. This interface, described in PR literature as "fully compatible in hardware and software with the IBM PC," allows PCs to be added to the Corvus Omninet network. This network, which uses twisted pair cabling, lets users combine multiple microcomputers with different operating systems on one network. It can support 63 computers.

PCs are proliferating all over the country.

Omninet is billed as a low-cost alternative to more expensive coaxial-based networks such as Ethernet. By using this network, IBM PCs can share up to 80 million bytes of Corvus mass storage, intercommunicate between all computers on the network, and share printers.

Corvus also announced a powerful work station of its own to link up to Omninet. Called the Corvus Concept, it is built around the 32/18-bit Motorola 68000 processor and comes with 256K of RAM expandable to 512K with built-in Omninet interface, word-processor, spreadsheet, and CP/M software.

Demonstrated at the show was a network of several Apples, IBM PCs, and Corvus Concept machines. PC tried to get in close enough to interview one of the Corvus personnel, but it was next to impossible. The place was mobbed throughout the show.

Practical Peripherals

This company was demonstrating a circuit card, called Micro Buffer, that plugs into an Epson or IBM dot matrix printer. The card serves as a memory cache so that data from the PC can be sent out to the printer at high speed and stored there until the document is printed. Meanwhile, you can use the PC for other purposes. We interviewed Larry Angel about this product.

Of Camels And Tents

Personal Computers at NCC: From basement to ballroom, a 5-year perspective on the growth of the PC phenomenon.

To truly appreciate the scene at this year's National Computer Conference in Houston, you need to travel 5 years back in time and 243 miles northwest to a basement in Dallas.

You would then be in the time and place that the NCC—premier conference and trade show of the traditional computer world—first gave grudging recognition to personal computers. They had not been taken very seriously, you understand. While the event taking place on the main floor of the Dallas Convention Center was important business—a computer conference—the newly minted personal computer doings down in the basement were relegated to festival status.

That personal computers got even as far as the basement was largely the accomplishment of Portia Isaacson, then a professor of computer science who was respected enough in established computer circles to have been appointed chairperson of that year's NCC, yet who was also far enough in the vanguard of the personal computer phenomenon to have opened one of the first retail computer stores. Isaacson, with one foot in each world, was both moved and able to lobby for giving the new "micros" at least a token place in the Dallas event.

It was, as you may guess, like letting the nose of the camel poke into the tent.

The next year personal computers moved out of the basement and into the grand ballroom of the New York Hilton, a few blocks from the NCC's main site in the Coliseum. Apple Computer had by then risen enough in the world to hire a gleaming white limousine, emblazoned with its rainbow logo, to shuttle VIPs over from the main hall to see its wares. And Radio Shack somehow inveigled its way into the Coliseum itself, where it introduced its business-oriented Model II computer.

One year later the personal computer

contingent was in the exhibit hall of the Disneyland Hotel, while the main event was in the nearby Anaheim Convention Center. Apple's hospitality grew to the point of buying out Disneyland for a whole evening and throwing a private bash for all conventiongoers. Also that year, NCC management announced that personal computer festivals would be no more. Henceforward, they said, personal computers would be incorporated into the main conference. (Some viewed this as long overdue progress; others protested that their micro offerings would become lost in the glittering circus dominated by the big-machine companies.)

Last year's NCC in Chicago was the first under the new plan. Personal computers did not get lost. People managed to ferret out and crowd around such objects of curiosity as Adam Osborne's just-introduced $1,795 portable computer. And Atari had a main-hall exhibit about as big and slick as IBM's.

This year in Houston's sprawling Astrohall it suddenly seemed that personal computers were the main event. The camel had indeed taken over the tent.

Signs of Change

Although the IBM Personal Computer was almost a year old, this was its first appearance at a major show. And did it ever have plenty of company! Small and capital letters alike, PCs were everywhere. Digital Equipment Corporation had 'em. Wang had 'em. (Their "P" stood for "professional.") Xerox had 'em. Japan's NEC had 'em, (with an "A" for "Advanced" tucked in front of the PC designation). And it seemed like a dozen or more other Japanese companies had 'em too—finally for real this time, instead of as prototypes.

The lecture hall where Portia Isaacson was scheduled to lead a panel discussion on "The Future of Personal Computing" was filled past standing room capacity half an hour before starting time. A stream of late arrivals pressed in on closed doors and muttered menacingly, as a lone, worried-looking official called woefully into his walkie-talkie for "any available volunteer to assist with crowd control." (Loudspeakers were ultimately set up in the antechamber for the overflow crowd.)

PERSONAL computers moved out of the basement and into the grand ballroom.

One might speculate whether IBM's introduction of the PC opened the floodgates, or whether the PC was simply an early splash of a flood initiated by other forces. Whichever way you figure it, the flood had hit.

The 16-Bit Fashion

An abundance of new computers based on 16-bit processors, both hybrid (like IBM's) and pure, was there. Many are able to read data disks written for or by IBM PCs, and a majority of those are also capable of running PC programs.

Most of the new 16-bitters seemed built on a somewhat different concept than IBM's—targeted more narrowly toward "office/professional work station" use. None was as modular as IBM's design, nor as hospitable to integration with products from other makers. Unlike IBM, none of the new crowd seemed to see value in offering a "stripper" model with a sub-$1,600 price tag; the floor for DEC, Wang, and other companies was about double that.

In personal computers with 8-bit processors the price floor was dropping. Cromemco and Morrow Designs, two companies with roots in the early days of personal computers, both introduced desk-top units packaging together hardware and software roughly on par with the Osborne 1 portable computer and at prices slightly undercutting it. As desk-top designs, both avoid the small display screen often cited as the Osborne's major shortcoming. (The Morrow unit sells for as little as $1,195 with one disk drive, but has no display or keyboard and must be used with a terminal purchased separately.)

In a telling reverse on the recent phenomenon of plug-in adapters to let IBM PCs run 8-bit programs written for earlier machines, several manufacturers of 8-bit machines—including Commodore, North Star, and Vector Graphic—introduced 16-bit adapter cards that equip their computers to run PC-type software.

In addition to the new products from Wang and Digital Equipment, personal computers with 16-bit processors were

NCC ROUNDUP

PC: Tell us about Micro Buffer.

Angel: Micro Buffer fits right into the Epson printer to give you a 16K buffer. At $159 it is a very low-cost option. And it is easy to install, about like putting in a light bulb. If you want to get a bigger buffer, we also have a stand-alone buffer; the IBM plugs into it, and the Epson plugs into it. You can also support a serial or parallel port. Starting at $299 for a 32K version, you can go up to 256K.

PC: Where is it available?

Angel: It has been accepted at ComputerLand corporate headquarters and should be in ComputerLand stores soon.

Holland Automation

The next booth we saw with an IBM PC was a software house called Holland Automation. We asked the president, Alan Routledge, to tell us about their software for the PC.

Routledge: Well, we're running our integrated software packages on the PC. What we've got is a sophisticated, integrated application package—building blocks. It's software that's been around since 1974, and we run it on a series of different machines. The software can be delivered in any language: Spanish, French, English, German, etc.

PC: How much memory does this package take?

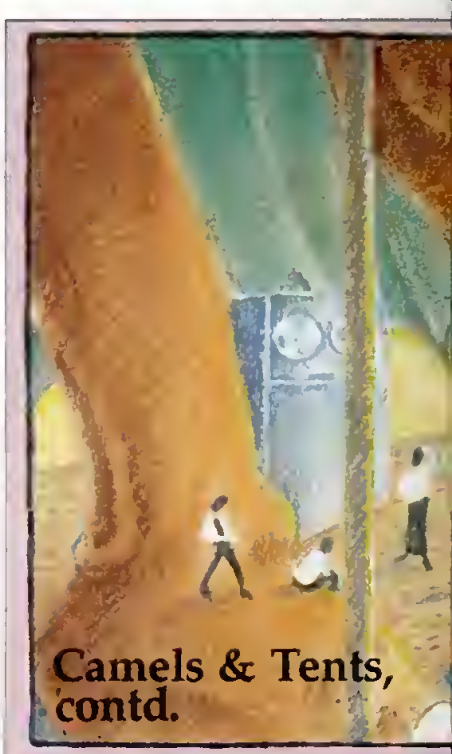
Routledge: We can run the whole thing on 48K. We supply our own BASIC Interpreter and all our application packages written in our version of BASIC that is compiled, which is why it is portable.

PC: All your programs are tied together so you can have them all on line at one time?

Routledge: It's not on line at once because the disk capacity doesn't generally allow for it. But you can take a program and run it on its own, or you can link it up with another program. For instance, if you post your receivables, and you're running general ledger, you first collect the data stored on disk. Then we have programs that transfer it to your general ledger disk. No rekeying; it is an automatic process. It allows you to change the disks so you can have two disks for general ledger and two for receivables.

PC: Does it run on hard disk?

PC talks to Holland Automation President, Alan Rutledge.



Camels & Tents, contd.

shown by Matshushita, Olivetti, Zenith, and a sprinkling of lesser-known names. As part of a general trend, most were offered in both monochrome and color versions—with high-resolution color display adding about $1,000 to the price. A departure from IBM's color/monochrome approach is that the monochrome systems from these other companies generally have the same graphics display abilities as their color counterparts, except for the color itself.

With increasing availability of color displays, software companies seemed more inclined to use color in product design. MicroPro International previewed a color-enhanced (or at least "color-decorated") version of its *WordStor* word-processing program, and another word-processor, *Benchmark*, was also shown in a color version.

Things to Come

Several glimpses of the future could be snatched while prowling the NCC aisles. On its top-of-the-line personal computer model, Digital Equipment Corporation showed an intriguing option called the Telephone Management System (TMS). This option integrates your personal computer with your phone system, allowing you to use the computer as an electronic

phone directory and autodialer. Facilities for conference calling are also included, as is hardware that would let your computer function as an "intelligent" answering machine to translate voice messages into digital form for recording and playback from standard disk storage. Programs realizing this potential are not availabla yet, but the prospect is eye-opening.

Laser printing, a powerful printing technology, made its first moves into the realm of practicality for personal computers. Laser printing is the familiar office photocopying process, except that it uses "originals" that exist only in computer memory and are written onto the copier drum with a laser beam. It permits many different type sizes, styles, and orientations (horizontal and vertical) to be mixed on a single sheet with near-typeset quality, and usually allows graphics to be mixed in as well. It turns out finished pages a dozen or more times faster than the conventional printers. For about $18,000, Xerox's model 2700 will hook right up to your PC (though software may take some tinkering).

Several other companies—mostly Japanese—were showing products at promising stages of development. Minolta showad the most intriguing one of all; it scans as well as prints, meaning you could use it to read pictures into your computer for manipulation by image procassing software, and ultimately to read in text from printed documents.

If laser printing is too exotic for your blood, another versatile printing approach also seemed close to maturity and acceptance—high-precision matrix printers that offer similar advantages to laser printing (variable type styles, etc.) but that print much more slowly. DEC's display of a printer with this design indicated that the approach achievad establishmant status, and several other companies displayed similar products.

Another printing development, color, also seemed to enjoy a leap in acceptance from previous shows while dropping rapidly in price. One color printer by Epson (makers of IBM's matrix printer for the PC) was shown without a price tag since it was officially a "preview" product, but Epson's past history suggests it will be very competitive when introduced.

TANTALIZING the crowd with pictures of yachts and Mercedes-Benzes, he urged them to get busy creating products his firm could sell.

Falling prices in other product categories were evidenced as well. Leading Edge showed a modem for a computer-phone connection with a $99 retail price. And Comshare Target Software was promoting its $50 spreadsheet program. NCC, as a conference sponsored by a nonprofit organization, permits no actual selling on show premises. But Target's *PlonnerCalc* program was on sale in the gift shop of the hotel across from the Astrohall, and reportedly enough copies were sold to cover the company's expenses for exhibiting at the NCC. (An IBM PC version of the product had not yet been introduced, but Target's Bob Ranson said its release was imminent.)

In the Lecture Halls

Many NCC attendees are likely present or future personal computer program authors, and they got inspiration in a couple of directions from the conference program. Dave Wagman of the distribution firm Softsel told a packed hall about the 15 people under age 25 who had collected more than $100,000 each last year in personal computer software royalties. Tantalizing the crowd with pictures of yachts and Mercedes-Benzes, he urged them to get busy creating products his firm could sell.

Shows and No-Shows

The personal computer was on display in the IBM booth, but no special fuss was made over it. It was quietly integrated with exhibits of tha company's whole range of products. Digital Equipment Corporation, by contrast, practically had brass bands out for its new personal computer lina, which had been introduced only weeks before. Not content with mere flyers, DEC was frealy handing out slick, full-color, 180-page books about tha new line.

Atari, which came on so big last year, didn't show at all this time, choosing instead to make a splash at the Consumer Electronics Show going on simultaneously in Chicago. In a way you could say Apple Computer wasn't there either. Apple did have a nice display booth, but all it faatured was software.

It all goes to show how volatile things are in the personal computer industry. Next year the NCC will revisit Anaheim, and if the growth in the personal computer industry keeps up, Disneyland is going to seem tame by comparison. */PC*

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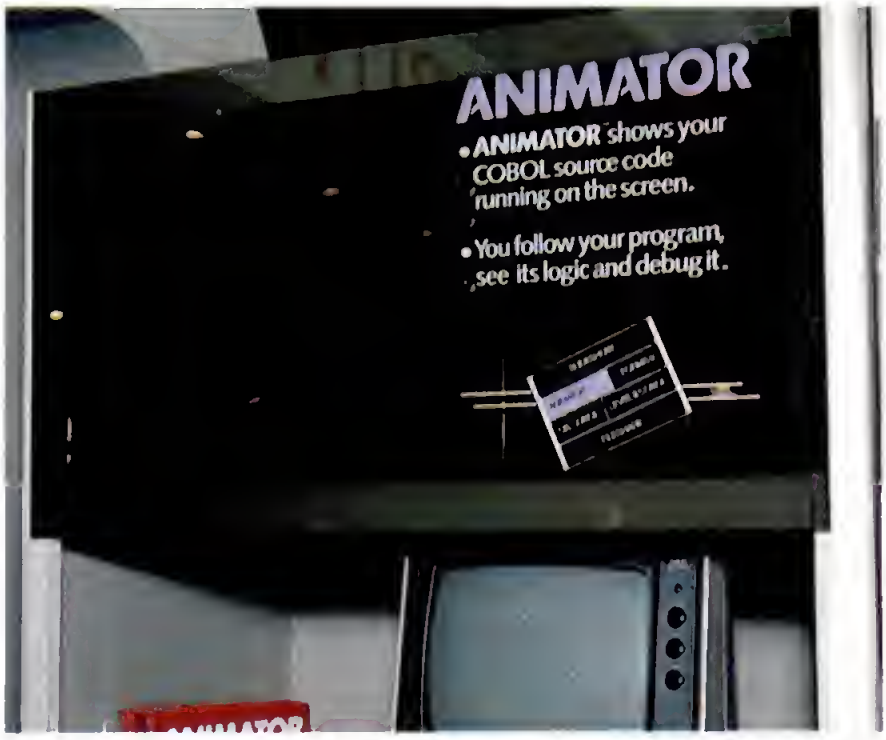
NCC ROUNDUP

David Britton, president of Britton-Lee, demonstrates the intelligent doto base machine.



Micro Focus was showing Animator, o program thot makes it easier to create and debug COBOL source code.

Routledge: Wa haven't yet, as the product was just raleased, but wa will have it soon.

Leading Edge

The main attraction at Leading Edge was a famous sidawalk painter who was working on a canvas portrait of an elephant—evoking images of Leading Edge's diskette advartisamants. This up and coming New Jersey company has mora to offer PC users than diskettes, however. One exampla is tha ProWritar II dot matrix printer. Selling for under $1,000, tha output text is of correspondance quality, though not that of a daisy wheel. The ProWritar also has high-resolution addressable graphics. It makes two passes and has a speed of 120 characters per second. The parallel var-

sion has a 1K memory buffer, while the RS-232 has a 3K buffer. It will plug in directly to tha IBM PC printar interface.

Leeding Edge also introduced a low-cost RGB $299 color monitor, a BMC product they have been licensed to sell. Whila it lacked tha rasolution of tha more expensiva high-resolution monitors, for the price it really looked excallent.

grammer a much more visuel picture of a program's structure.

The third is Form-2, which lets you "paint" e form on the screen, and then eutometically generates the source coda describing it. Because it is done by tha computer, the code is error-free, and creating end meinteining screen formets is much fester end easier.

VisiCorp was demonstrating VisiDex on the PC. VisiDex *can best be described as o computerized index cord system.*

Micro Focus

This London-based company with offices in Senta Clara, California, known for its CIS COBOL end LEVEL II COBOL languages, was selling the concept of visual programming. Visuel progremming, eccording to Micro Focus, is contained in three programming tools for the COBOL languages. The idee is based on left brain/right brain theory, and it reportedly makes programming highly visuel and intuitive.

One of thesa programming tools, callad Animator, will let you follow the logic of e program es it is running. The sourca code is displeyed right on the scraen and the cursor moves from stetamant to statamant as execution proceeds. Consequantly, Animator should make it easier to debug programs.

A second tool, Slideshows, halps programmers creeta visuel eids such as manus. It can elso ba used to draw animated flow cherts end otharwise give the pro-

WordStar in Color

As expected, MicroPro was demonstrating *WordStar* on the IBM PC, but we were surprised when we saw a full-color implementetion. Charles Stevenson, MicroPro's product plenning specialist, explained that it was only an experiment, set up for the NCC to measure the reactions of the people who saw it. He discussed with us soma of the edvanteges of color word-processing. Stevenson explained that you can change tha color of words in marked blocks of copy so the eye can see them instantly. Ha also showed us how to change foraground and background colors easily so you can have white type on e blue background, for instanca.

PC elso chatted with Bruca Basil, vica president of marketing, who informed us that eccording to a MicroPro survey, MicroPro is now the number-one softwera company in personal computing in terms of dollar voluma. MicroPro's *MoilMerge*

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is also available for the IBM PC—a *WordStor* option for producing personalized form letters. Forthcoming are other options, such as *SpellStor*, a spelling checker; *DotoStor*, data entry and retrieval; *CalcStor*, spreadsheet; *SuperSort*, for sorting, selecting, and merging; and *WordMaster*, a text editing program.

Tecmar

Tecmar was showing a PC with a Tecmar hard disk and expansion chassis hooked up to a video camara with color printer output. Pictures from tha camera were being drawn by the printer. We asked marketing director Dave Wertman to explain what was going on.

Wertman: We've got our Video Van Gogh Digitizer hooked up to the IBM PC. As you can see from tha imaga here, we are using a standard black and white camera. A single command digitizes the scraen on the 200 by 200, high-resolution screen. We have four colors available in high resolution, which we are mapping to the screen. Using a prism printer, we can match it up to about nine diffarent colors. Although

WE ARE just mapping them into groups, which results in a surrealistic color art application for the PC.

we have 256 different gray levels in color, we ara just mapping them into groups, which results in a surrealistic color art application for the PC.

PC: *Could you have Video Von Gogh moke o portrait for the cover of PC magozine?*

Wertman: Sura.

Tecmar is shipping 25 different expansion options for the IBM PC. Introduced at the NCC was a shared 5- or 10-megabyta hard disk, which can be connected up to four IBM PCs. These systems have both DOS and CP/M-86 support, and can be

split into two logical devices. For securing files there is a file lavel lockout. Back-up and copy utilities are also provided.

Tecmar also announced a set of industrial product boards for the PC. Thesa products should increase the functionality of the IBM PC in control, robotics, and data acquisition. Included are an IEEE 488 Interface, steppar motor control, and ona digital to analog converter along with two analog to digital boards. Wertman also showad PC some other products.

TRUDGING across the dusty parking lot, one can't help but think that the IBM PC is here to stay.

Wertman: Here's a board that's going to become very important.

PC: *Time Master. Whot does it do?*

Wertman: It's a time of day and calendar board. Right now, when you boot up PC DOS 1.0, it asks you for the date. PC DOS 1.1 will also ask you for the time. People I know skip past the date with a Control-C or something. When the time comes for that file to be tima-stamped, it is going to be more important. So for $99 retail, why not?

PC: *Con you tell us about onything thot's coming up?*

Wertman: Sure, 8-inch floppies. Later this month we are showing a PC that has no 5-inch floppies. It will have two 8-inch floppies and a hard disk. Everybody's talking about Xedex Baby Blue (See PC, June/July). The missing element, besides Baby Blue, is gatting that softwara over. With 8-inch diskettes you have that capability. You can read CP/M 8-inch files.

* * *

End of tour. Time to go out into the hot Texas sun. Trudging across the dusty parking lot, one can't help but think that the IBM PC is hare to stay. */PC*

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Net Worth Statement

The cornerstone of an effective financial plan is the Net Worth Statement. It shows how much money you'd have today if you were to sell all your assets and pay all your debts. It is a snapshot of your personal financial situation.

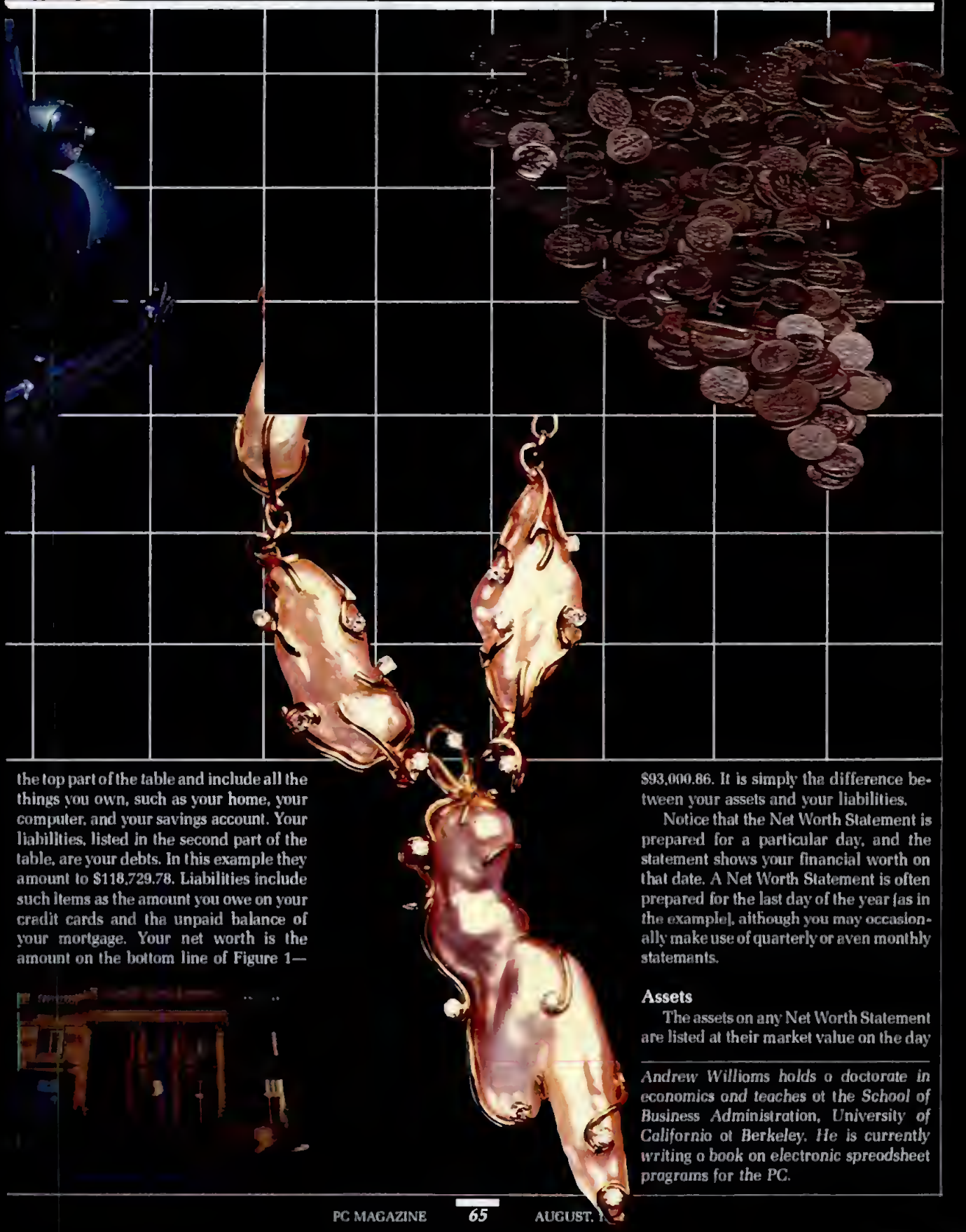
You must have a Net Worth Statement if you want to borrow money to buy a house, income property, or a business. You should have one in any case, because it is the benchmark against which you set your financial goals and measure your financial progress. No competent business owner would consider being without this information, and you shouldn't either.

If you have a personal computer and one of the electronic worksheet programs described elsewhere in this issue, the task of preparing your Net Worth Statement will be greatly simplified. Furthermore, you can use the program to analyse your statement and employ the "what if" function to examine as many different financial futures as you'd care to imagine.

In this article we'll set up a Net Worth Statement, analyse it, and suggest some pertinent "what if" questions to build into your own version of this essential calculation of worth. Figure 1 shows an electronic worksheet designed to calculate an individual's net worth. When you prepare your own statement, simply change the heading to fit your situation. The worksheet will tell you the most if you group similar items under one heading and if you don't clutter the worksheet with too much detail. After you've worked with this basic version, you can use the program's insert feature to create new lines as the need arises.

In the example in Figure 1, the assets amount to $211,730.64. They are listed in

Photographs: Dennis Bettencourt, David Bishop, Brian Desain Day, David Wasserman



the top part of the table and include all the things you own, such as your home, your computer, and your savings account. Your liabilities, listed in the second part of the table, are your debts. In this example they amount to $118,729.78. Liabilities include such items as the amount you owe on your credit cards and the unpaid balance of your mortgage. Your net worth is the amount on the bottom line of Figure 1—$93,000.86. It is simply the difference between your assets and your liabilities.

Notice that the Net Worth Statement is prepared for a particular day, and the statement shows your financial worth on that date. A Net Worth Statement is often prepared for the last day of the year (as in the example), although you may occasionally make use of quarterly or even monthly statements.

Assets

The assets on any Net Worth Statement are listed at their market value on the day

---

Andrew Williams holds a doctorate in economics and teaches at the School of Business Administration, University of California at Berkeley. He is currently writing a book on electronic spreadsheet programs for the PC.

right

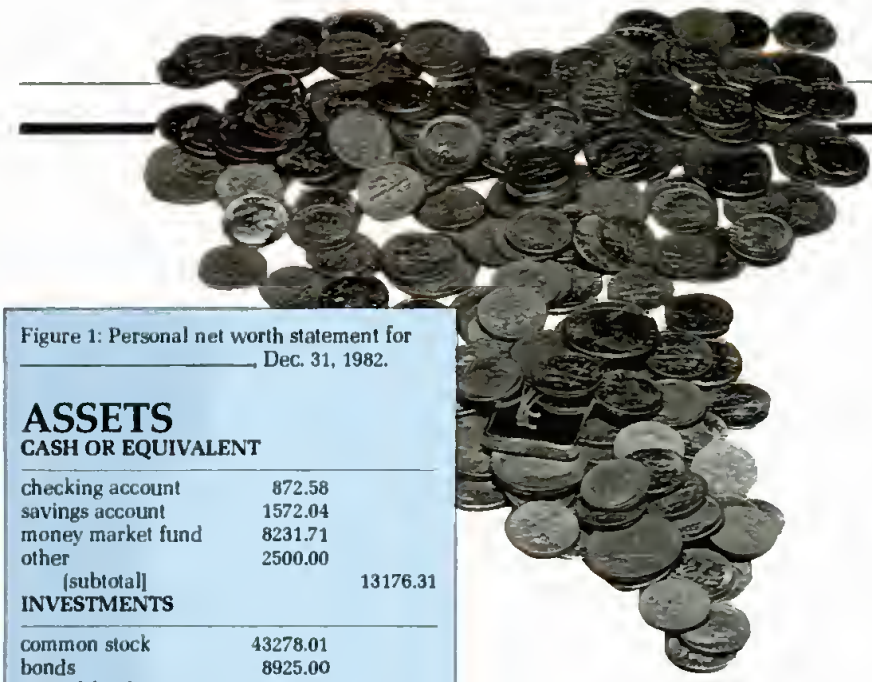


Figure 1: Personal net worth statement for _____, Dec. 31, 1982.

ASSETS		
CASH OR EQUIVALENT		
checking account	872.58	
savings account	1572.04	
money market fund	8231.71	
other	2500.00	
[subtotal]		13176.31
INVESTMENTS		
common stock	43278.01	
bonds	8925.00	
mutual funds	1851.32	
other	750.00	
[subtotal]		54804.33
REAL ESTATE		
home or condominium	118750.00	
land	10000.00	
other	3000.00	
[subtotal]		131750.00
OTHER ASSETS		
automobile[s]	1500.00	
personal property	4000.00	
personal computer	2500.00	
other assets	4000.00	
[subtotal]		12000.00
TOTAL ASSETS		**211730.64**
LIABILITIES		
DUE IN 30 DAYS		
charge accounts	129.28	
credit cards	452.71	
mortgage payment	986.00	
insurance	185.95	
other	351.08	
[subtotal]		2105.02
DUE IN 1-12 MONTHS		
installment credit	2194.54	
margin debt	13721.81	
income tax	1871.32	
property tax	1462.08	
other	1152.00	
[subtotal]		20401.55
DUE IN MORE THAN 12 MONTHS		
mortgage on home	81590.21	
other mortgages	7218.79	
automobile loans	815.36	
education loans	8521.36	
other	2182.51	
[subtotal]		98328.23
TOTAL LIABILITIES		**118729.78**
NET WORTH		**93000.86**

the net worth is calculated. For example, you would not list your computer at its purchase price, but at its current market value (which is probably much less than you paid for it). Conversely, the market value of a house purchased a few years ago may be much greater than the purchase price.

To determine the market value of frequently traded assets such as stocks and bonds, it is a simple matter to look up their prices in the financial section of a newspaper. For infrequently traded assets, such as homes, cars, and computers, you will have to estimate market value. Be conservative when you make your estimates; it is better to underestimate these values (and thereby overshoot your goals) than to overestimate and come up short.

There are some common guidelines for determining the market value of your assets. You can use classified ads, publications such as the *Blue Book* for used cars, and recent auction sales to value items such as furniture, jewelry, and art. Some items are sold so infrequently that you may have to get a professional appraiser to estimate their value. Your insurance agent can recommend an appraiser.

You may also want to talk with your insurance agent after calculating the value of your assets, to be certain that you have adequate insurance on your home and possessions.

As Figure 1 indicates, your assets are listed with the most liquid at the top, moving down to the least liquid at the bottom. "Liquidity" simply describes how easily an asset can be turned into cash. The balance in a checking account, for instance, is very liquid; you can have the cash by writing a check. The only thing more liquid is the money in your pocket. Your car and your computer, on the other hand, are much less liquid.

The amount of liquidity of an individual's assets is important. If too many of your assets are liquid, you have probably missed attractive investment opportunities. If you have too little liquidity, you may not have enough money to make daily purchases or to cover an emergency.

Your most liquid assets are used for current living expenses and bills as they come due. But some of them should also be available for contingencies, such as losing your job or becoming ill. As a rule, you should try to keep about 6 months' worth of income in fairly liquid form.

Liabilities

The second half of a Net Worth Statement—liabilities—is also ranked from top to bottom, like the listing in Figure 1. The first group of items, which are current liabilities, are those bills due today. The second group, bills due in less than 12 months, includes installment credit contracts and taxes (particularly real estate taxes) not covered by withholding. The last group of items includes long-term debt, typically real estate loans.

In general, you will have monthly payments to make on each of your liabilities. But you will be responsible for paying off the entire amount of those items near the top sooner than those items near the bottom. A Net Worth Statement with a lot of current liabilities (like the one in Figure 1) will require more income than one with the same total liability but with more long-term debt.

The Bottom Line

The bottom line on a Net Worth Statement is your net worth ($93,000.86 in Figure 1). If this is the first time you have prepared a Net Worth Statement, you may be pleasantly surprised. Most people do not know what they're worth. On the average, Americans have about $6 of assets for every $1 of liabilities. For homeowners in particular, a net worth of more than $100,000 is not unusual.

Don't be surprised if your net worth is less than this, however. Older people often have more net worth because they have smaller mortgages (or have paid them off completely) and their homes have in-

Figure 2: Analysis of net worth statement.

	ANNUAL NET WORTH			% DISTRIBUTION			$ CHANGE		% CHANGE	
ASSETS	1979	1980	1981	1979	1980	1981	1979-80	1980-81	1979-80	1980-81
CASH OR EQUIVALENT										
checking account	1181.32	872.56	456.20	0.62	0.41	0.21	−308.78	−416.36	−26.14	−47.72
savings account	756.58	1572.04	1828.19	0.40	0.74	0.78	815.46	58.15	107.78	3.57
money market fund	10692.48	8231.71	10653.28	5.65	3.89	4.99	−2460.77	2421.57	−23.01	29.42
other	1000.00	2500.00	2500.00	0.53	1.18	1.17	1500.00	0.00	150.00	0.00
INVESTMENT										
common stock	32871.50	43278.01	39228.32	17.37	20.44	18.38	10406.51	−4049.89	31.66	−9.36
bonds	6191.80	8925.00	9187.62	3.27	4.22	4.30	2733.20	282.82	44.14	2.94
mutual funds	320.27	1851.32	1673.21	0.17	0.87	0.78	1531.05	−178.11	476.05	−9.82
other	250.00	750.00	500.00	0.13	0.35	0.24	500.00	−250.00	200.00	−33.33
REAL ESTATE										
home or condominium	112350.00	118750.00	123650.00	59.38	58.09	57.94	6400.00	4900.00	5.70	4.13
land	9500.00	10000.00	10000.00	5.02	4.72	4.89	500.00	0.00	5.28	0.00
other	2000.00	3000.00	2500.00	1.06	1.42	1.17	1000.00	−500.00	50.00	−18.87
OTHER ASSETS										
automobile(s)	2000.00	1500.00	1000.00	1.08	0.71	0.47	−500.00	−500.00	−25.00	−33.33
personal property	3100.00	4000.00	4500.00	1.64	1.89	2.11	900.00	500.00	29.03	12.50
personal computer	3500.00	2500.00	1750.00	1.65	1.16	0.82	−1000.00	−750.00	−28.57	−30.00
other assets	3500.00	4000.00	4200.00	1.85	1.89	1.97	500.00	200.00	14.29	5.00
TOTAL ASSETS	189213.95	211730.64	213428.82							
LIABILITIES										
DUE IN 30 DAYS										
charge accounts	283.50	129.28	459.88	0.26	0.11	0.40	−154.22	330.58	−54.40	255.71
credit cards	195.00	452.71	177.06	0.16	0.37	0.15	257.71	−275.63	132.16	−60.88
mortgage payment	986.00	986.00	986.00	0.90	0.82	0.85	0.00	0.00	0.00	0.00
insurance	152.75	165.95	211.11	0.14	0.15	0.18	33.20	25.16	21.73	13.53
other	218.53	351.08	419.70	0.20	0.29	0.36	132.55	68.62	60.66	19.55
DUE IN 1-12 MONTHS										
installment credit	1951.62	2194.54	2208.11	1.77	1.82	1.91	242.72	13.57	12.44	0.62
margin debt	7778.38	13721.61	13174.65	7.06	11.36	11.39	5945.25	−546.96	76.45	−3.99
income tax	1528.50	1671.32	2161.21	1.39	1.55	1.87	342.82	289.89	22.43	15.49
property tax	1279.19	1462.08	1691.50	1.16	1.21	1.46	182.89	229.42	14.30	15.69
other	572.80	1152.00	761.90	0.52	0.95	0.66	579.20	−390.10	101.12	−33.86
MORE THAN 12 MONTHS										
mortgage on home	85432.50	81590.21	78632.80	77.60	67.52	66.44	−3842.29	−4757.41	−4.50	−5.83
other mortgages	500.00	7218.79	6921.28	0.45	5.97	5.99	6718.79	−297.51	1343.76	−4.12
automobile	1206.71	815.36	639.72	1.10	0.67	0.55	−393.35	−175.64	−32.54	−21.54
education loens	7328.92	6521.38	5712.19	6.66	5.40	4.94	−807.56	−809.17	−11.02	−12.41
other	871.80	2162.51	3281.67	0.61	1.81	2.84	1510.71	1099.16	224.87	50.36
TOTAL LIABILITIES	110086.38	120834.80	115636.78							

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creased in value. Younger people have more debt because they are just starting to accumulate capital, and they haven't had much opportunity to build up equity.

While it is good to know where you stand at one point in time, much of the usefulness of a Net Worth Statement comes when you have information for several consecutive periods. Then you can see whether your net worth is evolving in the ways needed to achieve your financial goals. If it isn't, you can take timely action to get back on track.

Figure 2 shows some of the statistics you would want to calculate from your Net Worth Statement. The first three columns show the net worth for the years 1979 to 1981. The next three columns show the percentage distribution of assets and liabilities. The next two columns display the year-to-year change in dollar amounts in each category, and the last two columns show the year-to-year percentage change for each item. Many similar statistics can be calculated easily with one of the electronic worksheet programs.

We have implicitly assumed a zero rate of inflation. Since there is bound to be some inflation in the next 35 years, the assets must actually grow at the rate of inflation plus 5.93 percent. If you think inflation will average 7 percent over the next 35 years, your net worth must grow at a rate of 12.93 percent per year to provide the same real purchasing power as the $300,416 in the example.

Taxes are the other complicating factor. Unless your income is tax sheltered, you will have to pay part of the return on your investment to Uncle Sam. If you are married, file a joint return, earn about $30,000 and have the typical number of dependents and deductions, you are likely to be in the 33 percent tax bracket. In this case, you must earn a rate of return half again as high as if you paid no taxes. In the example in Figure 3, you would need to average about 19 percent growth per year to achieve your goal.

Figure 3: "What if" exercise to determine retirement net worth.

Interest Rate = 5.93%

Age	Year	Net Worth
30	1982	$40,000
31	1983	42,327
32	1984	44,885
33	1985	47,546
34	1986	50,366
35	1987	53,353
36	1988	56,516
37	1989	59,868
38	1990	63,418
39	1991	67,179
40	1992	71,162
41	1993	75,382
42	1994	79,852
43	1995	84,588
44	1996	89,604
45	1997	94,917
46	1998	100,540
47	1999	106,508
48	2000	112,824
49	2001	119,514
50	2002	126,602
51	2003	134,109
52	2004	142,062
53	2005	150,486
54	2006	159,410
55	2007	168,863
56	2008	178,876
57	2009	189,484
58	2010	200,720
59	2011	212,623
60	2012	225,231
61	2013	238,587
62	2014	252,736
63	2015	267,723
64	2016	283,599
65	2017	300,416

Figures prepared with the help of Oel Hardy of Computer-Land, El Cerrito, CA.

IF THIS IS THE first time you've prepared a Net Worth Statement, you may be pleasantly surprised.

What If . . .

You can use the "what if" powers of your electronic worksheet to determine how fast your net worth must grow to meet a particular objective. Retirement income is a common goal, so it makes a good example. You would begin by establishing a worksheet that has the same number of rows as the number of years to your expected retirement age. For this example (Figure 3), we'll assume a current age of 30 and a retirement age of 65. We will also assume that the income-earning portion of your current net worth (that is, cash or securities that earn interest) is $40,000. This is what will have to grow to provide for retirement.

We will assume that your goal is to have a net worth of $300,000 at age 65 in order to provide a retirement income of $30,000 per year. (This is based on a yield of 10 percent on your nest egg.) Given these assumptions, you can use the "what if" function to substitute different values for the year-to-year rate of return on assets to see how fast your net worth must grow to reach your goal. As you can see from the interest rate at the top of Figure 3, the answer is approximately 5.93 percent.

From the numbers in Figure 3, it appears that your goal can be achieved quite easily. Unfortunately, we've left out two important considerations—inflation and taxes.

This growth rate may seem like an impossible goal but it isn't. Individual Retirement Accounts, capital gains, and other ways to shelter income from taxes are available and should be part of your financial plan. Furthermore, our example doesn't allow you to dip into capital, which can be a prudent thing to do in retirement years. Nor does it assume any contribution to net worth out of your current income. Most people do save, and even a modest program can add significantly to your net worth.

Your savings rate, future income, inflation, tax rates, and growth in net worth can all be investigated easily and efficiently with a personal computer and an electronic worksheet. The examples in Figures 1 to 3 are just an introduction. How far you wish to take your own financial planning is up to you. The more you plan, however, the more control you will have over your future and the better the chances of achieving the goals you have set for yourself and your family. */PC*

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After 4 years as king of the spreadsheet program, VisiCalc has a new contender and PC provides the torture test.

CALC WARS

VisiCalc, *Visicorp*
2895 Zanker Rd.
San Jose, CA 95134
(408) 946-9000
List price: $250

SuperCalc, *Sorcim*
405 Aldo Ave.
Santa Clara, CA 95050
(408) 727-7634
List price: $295

The Calc Wars have erupted, and it looks like battles will be waged over many years and on many fronts. *VisiCalc*, which in 1978 virtually spawned a new software concept and became the single most popular microcomputer program (estimated 250,000 copies sold), is now being challenged by established and emerging software publishers and authors.

In this article we'll make a detailed comparison of *VisiCalc (VC)*, and another of the major worksheet programs, *SuperCalc (SC)*. We chose *SuperCalc* as the contender because it is one of the first electronic worksheet programs (after *VC*) to become fully operational for the IBM Personal Computer. We could therefore put both programs through tests based on released versions.

This article is designed as more than just a one-on-one contest, however. By exploring, in some depth, the features of these two programs, we hope to present information that can also be used to evaluate the PC versions of other worksheet programs we know will be appearing during the coming months.

The overwhelming impression when comparing these two programs is of similarities rather than differences. Both worksheets use the same format, are exactly the same size (64 columns by 254 rows), and are even specified identically (columns A through BK). Most of the functions are invoked by the same commands in both programs, using the same command format (a slash and a mnemonic single-letter designator). Several of the specialized commands are also the same (an exclamation point to force recalculation and a semicolon to switch windows).

All this similarity has led many people to refer to the newer programs—with some derision perhaps—as "Visiclones" or "Calcalikes." Copy-catism shouldn't be an issue, however. It's a tribute that *VC* has set the standard against which other worksheet programs are measured. And the programs following *VC*'s blazed trail have shown some consideration for the user by not arbitrarily choosing different formats and commands simply to establish separate identities. An exclamation point is a perfectly good command for recalculation. Praise to both programs for using it.

Data Entry

There are plenty of differences, however, and you'll experience many of them

as soon as you start entering your data. First, some terminology: The cursor keys are used to address one cell of the worksheet, called the "active cell," which is displayed in reverse video. Before a label, value, or formula is inserted into the active cell, it is entered on an "edit line," located in a "status area" either above or below the worksheet display. The status area also includes an "entry line," which indicates the contents, type, and format of the active cell, and a "prompt line," which presents your options for proceeding with the pending command.

Although the *VC* and *SC* status areas present virtually identical information, *VC* makes use of reverse video to distinguish the three lines, presenting a somewhat less cluttered display. (*SC* uses a separate line of the screen to remind you that the F1 and F2 keys are available for the "Help" and "Cancel" commands; *VC*, therefore, has an extra line available to display the main worksheet window.)

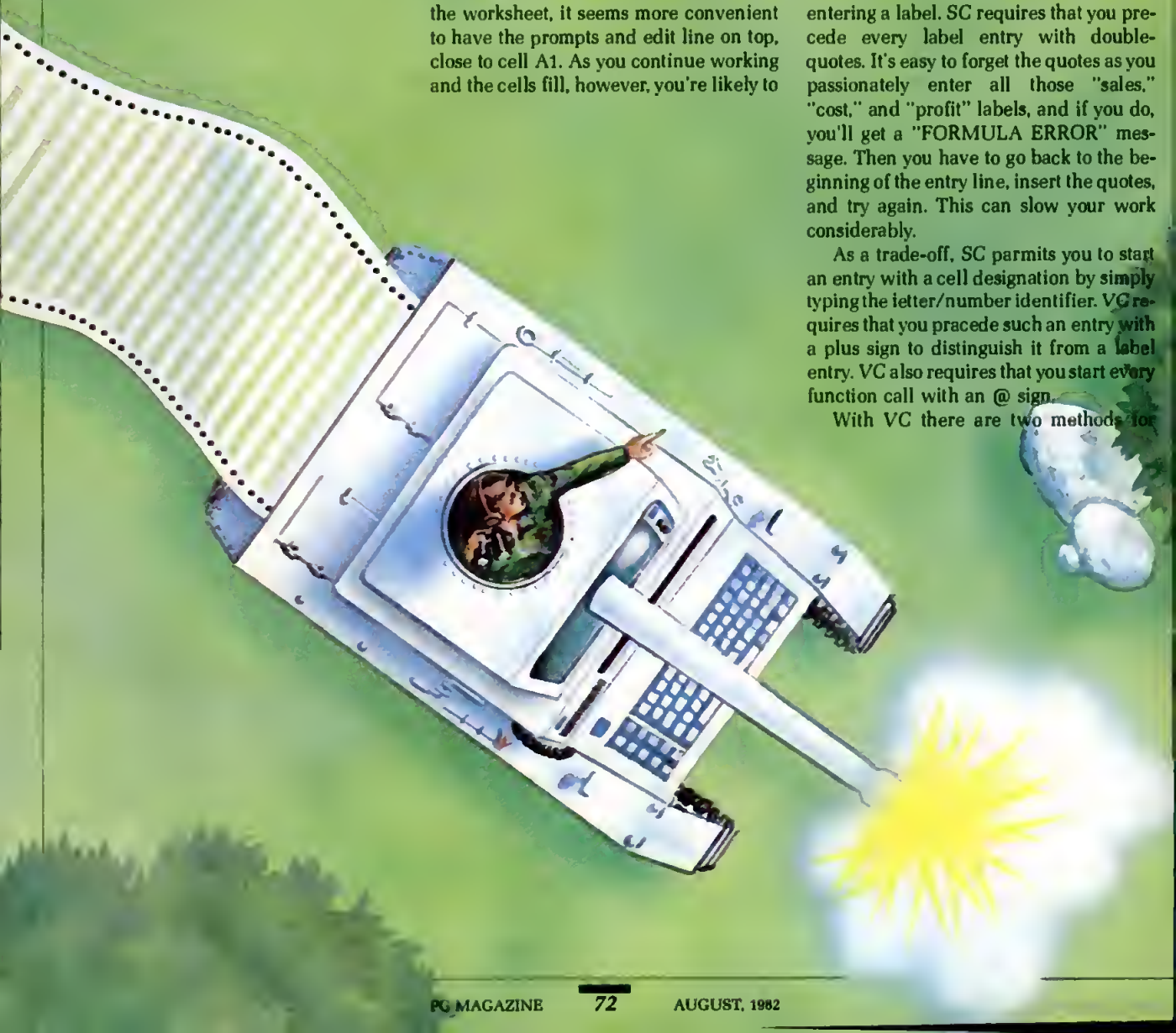
The *VC* status area is above the worksheet display, while *SC* places it below the worksheet. When you first begin filling up the worksheet, it seems more convenient to have the prompts and edit line on top, close to cell A1. As you continue working and the cells fill, however, you're likely to be entering data to fill cells along the bottom of the window display, so the *SC* format may be more convenient in the long run.

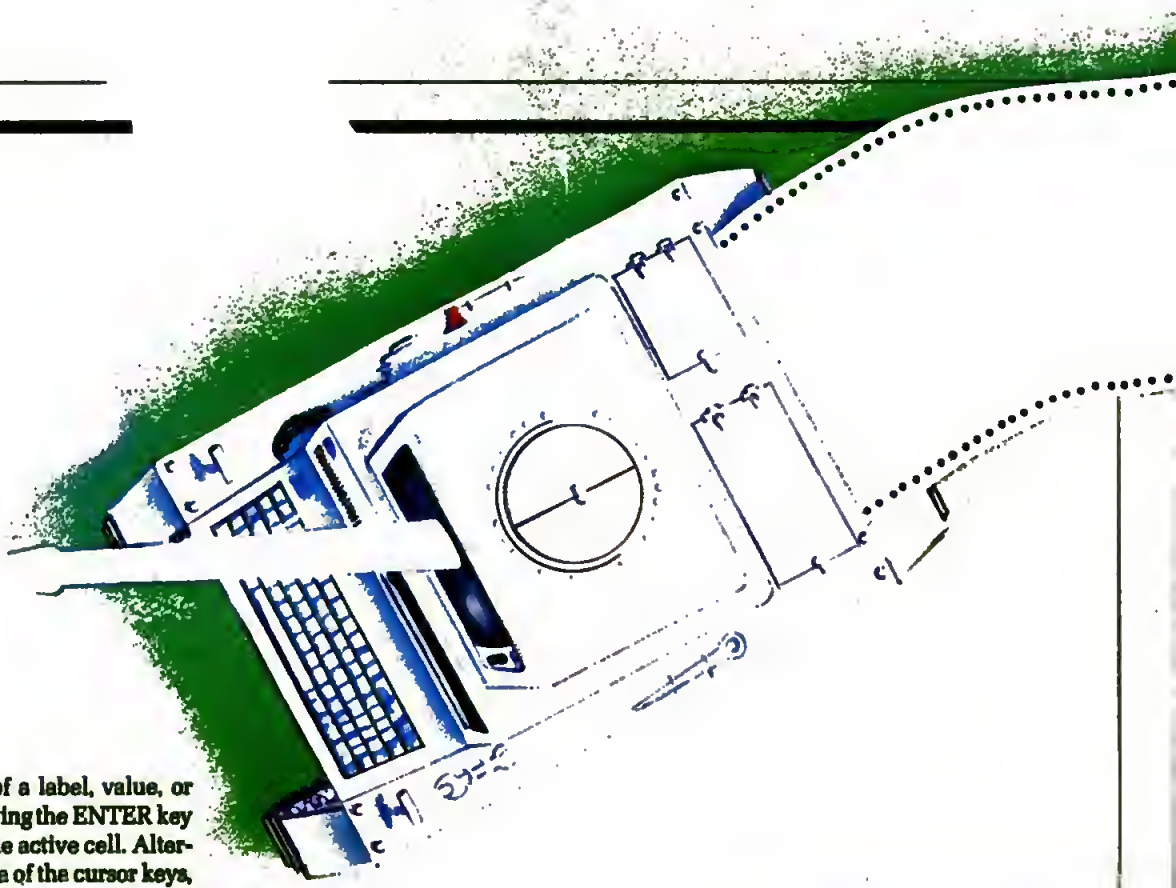
Such differences may seem inconsequential, but you should not overlook them. Since both programs perform essentially the same functions, these "style" considerations should weigh in your evaluation of which program suits your personal tastes. Over the course of hours and years of using a program, they will affect your working routines, mood, and efficiency.

The programs use different methods for entering labels, values, and formulas onto tha entry line. *VC* assumes that if you type a letter to start your entry, you are entering a label. *SC* requires that you precede every label entry with double-quotes. It's easy to forget the quotes as you passionately enter all those "sales," "cost," and "profit" labels, and if you do, you'll get a "FORMULA ERROR" message. Then you have to go back to the beginning of the entry line, insert the quotes, and try again. This can slow your work considerably.

As a trade-off, *SC* parmits you to start an entry with a cell designation by simply typing the letter/number identifier. *VC* requires that you pracede such an entry with a plus sign to distinguish it from a label entry. *VC* also requires that you start every function call with an @ sign.

With *VC* there are two methods for





completing the antry of a label, value, or formula into a cell. Hitting the ENTER key inserts the entry into the active cell. Alternatively, you can hit one of the cursor keys, which inserts the entry into the active cell and immediately shifts the active cell designation in the cursor key direction. To enter a column of figures, you can repeatedly hit the DOWN ARROW key instead of ENTER.

SC accomplishes the same result with a slightly more complicated system. All data is entered into cells with the ENTER key; however, hitting ENTER simultaneously shifts the active cell designation, in the direction of the previous cursor key command. For example, if you used the CURSOR RIGHT key to move from cell B2 to C2, entered data, and then hit ENTER, the data would appear in cell C2, and the active cell would shift to D2. If, on the other hand, the prior cursor command had been from C1 to C2, the data would be entered in C2 and the ective cell would shift to C3.

This system is a bit confusing at first. Even though the prompt area reminds you of the direction of the last cursor movement, you have to think twice about where you're headed; otherwise you'll find yourself retracing your progress and using extra keystrokes to do so. (This auto-advance feature can be disabled with one of the progrem's Global Options commands.)

SC's auto-advance does afford one significant utility, however. If you have a large amount of numeric data to enter, you cen set the direction of the active cell shift, disable the cursor functions on the numeric keypad, and use the keypad as a conventional adding machine while hitting the ENTER key with your thumb.

One of the real failings of the PC's otherwise superb keyboard is this fact that the cursor and keypad functions can't be used simultaneously. SC solves that problem by furnishing a duplicate set of cursor controls via the Control-S, -D, -E, and -X "diamond" keys familiar to *WordStar* users. Thus, you can move the cursor with your left hand while entering numbers with your right.

A few technical parameters: VC permits entry of values with up to 11 or 12 digits of precision. In exponential format, the largest number the program can calculate is .999999999999E62 and the smallest is 9.999999999E-66. SC handles numbers with up to 16 digits of precision, which can be raised or decreased by the 63rd power of 10.

VC's maximum label and formula entry is 76 characters. SC permits entries to be 110 characters.

Both programs provide adequate capabilities for editing an entry in progress as well as the contents of a previously entered cell.

Worksheet Formatting

In the construction of a worksheet, SC offers a number of extensions and embellishments. By far the most significent and useful is the ability to specify varying widths for different columns of the worksheet.

VC permits specifying column widths from three to 77 characters, but the width selected must apply to every column of the worksheet. This can be a bothersome restriction when entering labels, and can waste useful screen display space. Suppose you were setting up a sales report form that would accommodate amounts up to $999,999.99. Column widths of nine characters would be required to display the values. If you also wanted to display two-digit sales division or inventory codes, you would have to allocate nine-character columns for them as well. This would force you to spread your data over a larger area and make extra scrolling necessary to view that data.

With SC's variable column width potential, you could specify nine-character widths for columns C, E, G, and I, and two-character columns for D, F, H, and J and easily fit all that information within one 80-character screen.

SC's column formatting flexibility greatly aids the entry of labels onto the worksheet. Every VC user has probably run into the frustrating task of entering labels that have to stretch across several columns. The minimum column width with SC is 0 characters; the maximum is 126, viewable by scrolling the window.

SC provides an added feature for facilitating label entries. If an entry exceeds the defined width of its column, the text of that label will spill over into the next column so long as no other label, value, or formula has been entered there.

In both programs cell contents can be displayed in a number of ways. Values can be shown as rounded integers or in dollars and cents format with two decimal places. Labels and values can be displayed either right- or left-aligned within the cell. Both programs also offer a "bar graph" format that displays the value of the cell as a number of asterisks. SC lets you display all values in exponential format and allows you to distinguish between right- and left-justification of values and labels.

The real formatting advantage SC offers is the ability to format cells individually, by row or columns, or by blocks, as well as globally. (VC provides for only single-cell or global formatting). This formatting flexibility can save considerable time when setting up a large worksheet with different types of data.

The SC formatting system also makes use of hierarchical format levels. An individually formatted cell will take precedence over the format of its row, which in turn takes precedence over the intersecting column format, the block format, and the global format, in that order. When the Format Default command is given, the format for a particular cell or group of cells reverts to the format at the next level.

Both programs provide a way of reproducing or "replicating" a cell entry into one or more other cells. If the cell to be replicated contains a reference to another cell, it is necessary to specify whether that reference is to be replicated "absolutely," without adjustment, or whether it should be adjusted "relative" to the new cell location. For example, assume that cell A3 contains a formula that is the sum of cells A1 and A2. If A3 were replicated into B3 without adjustment, cell B3 would also contain the formula "Sum of A1 and A2." If B3 were adjusted relatively, it would contain the formula "Sum of B1 and B2."

Both programs also provide for repli-

MBA: Putting It All Together

A preliminary look at Context Management's new spreadsheets reveals a potentially good program with data base, word-processing, and graphics capabilities.

MBA, Context Monogement Systems
23864 Howthorne Blvd., Suite 101
Torrance, CA 90505
(213) 378-8277
List price: $695

The MBA from Context Management is lika an Olympic decathlon competitor. Such an athlete has to be a good runner, jumper, vaulter, and thrower. But he or she isn't going to be as fast as a sprinter, as strong as a shot-putter. or reach the heights of a polished pola vaulter.

MBA is a spreadsheet program, word-processor, graphics generator, data base manager, and will soon be a telacommunicator. At first it sounds like a famlly of products, but it is one product, at one price, with all functions (called "contexts") on line at the same time.

The Context people have been working on this program for 2 years, but it took this "second generation" of microcomputers to make it possible. Though any one of its "contexts" could have been accomplished on a 64K machine, it takes a 256K IBM with at least two disk drives to perform them all at once. To display graphics, MBA requires that your monitor be connected to a color/graphics card.

When you first start the program, it looks somewhat like a VisiCalc or SuperCalc spreadsheet. Context's Marketing Vice President Martin Mazner admits they borrowed a lot of commands and screen formats from VisiCalc, hoping to ease the transition for the VisiCalc users they expect to win over. Like the other spreadsheets, MBA includes built-in functions, such as average, sum, cosine, lookup, and Boolean values.

Although we did not have an opportunity to fully test MBA (the program was still being finalized whan PC visited their offices), we saw enough to see that it has the essential elements of a good spreadsheet program. Here's the catch: Like the decathlete, it's good at everything it does but not world class in any event. MBA is slower than VisiCalc and SuperCalc, thus not as well suited for number-intense applications. As a word-processor it's adequate for memo and letter writing but not for full-tima word-processing. Its graphics context won't thrill any art directors, and its data base managemant system is basic. But if you're a manager who does a smattering of financial planning and an occasional report, it might be all tha software you'll need.

Like the other "Calcs" the MBA sign on screen consists of rows and columns of "cells." Although it looks like a conventional spreadsheet, each cell is actually a large work space capable of storing up to 8,000 characters or numbers, letters, formulas, or even pictures.

You work in ona contaxt at a time. If you're doing a spraadsheat operation and decide to switch to word-processing, you change contexts by typing /CW. The "/" was originated by VisiCalc and is becoming a spreadsheet standard for "I'm about to give you a command." The "C" says, "I want to switch contexts," and the "W" says, "Let's do some word-processing."

In addition to the standard alphanumeric spreadsheet, data can be displayed through a pie chart, scatter graph, high/low graph, area chart, or one of several

cating whole or partial columns or rows of cells across other columns or rows. (SC also lets you replicate a row across a column.) When performing this type of operation, there may be many cell references for which an "absolute or relative?" choice must be made. VC prompts you for your choice with regard to each cell. SC gives you the option of making these cell-by-cell choices; otherwise, it assumes you want to make a wholesale relative replication.

Although the automatic relative replication feature of SC can be a convenience, you have to be more careful when replicating a formula, since you won't receive prompts for the absolute/relative choices unless you request them.

SC provides the ability to copy blocks of cells to other portions of the worksheet. The selected cell, row, column, or block can be copied identically, with formulas adjusted relative to the new cell positions, or as values only. These copy features are very useful for updating data. For example, if an Accounts Receivable group of entries were listed in the "Thirty Days Past Due" portion of a worksheet, they could easily be shifted to the "Sixty Days" portion at the end of each month.

FORMATTING flexibility can save considerable time when setting up a large worksheet with different types of data.

VC does not directly provide a cell-copying feature. This type of adjustment can be accomplished in some cases by using the Replicate function. In some instances, however, the only way to copy blocks of information is to write data to separate disk files and then re-enter the data at new locations in the original worksheet. (See the discussion of the "DIF" format below.)

SC offers a few more options not available with VC. Via a global command you can display either the formula contained in each cell or the calculated value of the formula. (VC displays calculated values only.)

SC also lets you "protect" the contents of a cell, column, row, or block. Once cells are so protected, no data can be entered into them, and they cannot be overwritten or edited until the cells are "unprotected." (Protected cells are displayed at half intensity.) This protection feature can be very useful in creating a worksheet in which some data will be entered repeatedly, such as an invoice form. Cells that contain formulas and constants crucial to the worksheet can be protected to prevent inadvertent modification of those parts of the form.

Both programs provide for splitting the display area either horizontally or vertically into two windows and for scrolling these windows either separately or in synchronization. Both programs also allow you to fix columns and/or rows as "titles" past which the active cell can't be moved with the cursor keys.

Color

If you have the color card and a color monitor or TV, SC can show labels and formulas in amber, positive values in pink, and negative values in red, all on a black background surrounded by a pale-blue border. The description of this color scheme might sound slightly New Wave, but the total effect is attractive and very striking.

(Although the SC-furnished sample worksheets from which the color photograph was taken display labels and formulas in amber, we couldn't produce this effect in the worksheets we created; all our entries displayed in pink.)

The importance of the color feature will depend on your personal taste and perhaps your applications for the program. Some people will find that the color adds a useful dimension to the information being displayed. Others may feel that the PC's excellent monochrome display offers better resolution and is easier on the eyes, especially during long work sessions. We also noted that scrolling the worksheet in SC's color mode takes about three times longer than when using the mono display.

Personal working habits notwithstanding, if you're going to make your division report to the Board of Directors or your sales pitch to a new client, you'll lova being able to conduct your electronic worksheet show in living color. SC provides short command programs for displaying in either color or green and black if you have both types of adapter cards and monitors.

SC has scored undisputed points over VC in the area of worksheet formatting, but it contains one small feature—almost insignificant at first—that really detracts from the program's ease of operation. This has to do with the GOTO command, which in both programs relocates the active cell to any specified coordinate of the worksheet.

With VC, GOTO "pushes" the active cell from its current location to the new one, as if you had usad the cursor keys. For example, assume that the screen is displaying columns A through H and rows 1 through 20. If A1 is the active cell and the command is given to GOTO M1, the

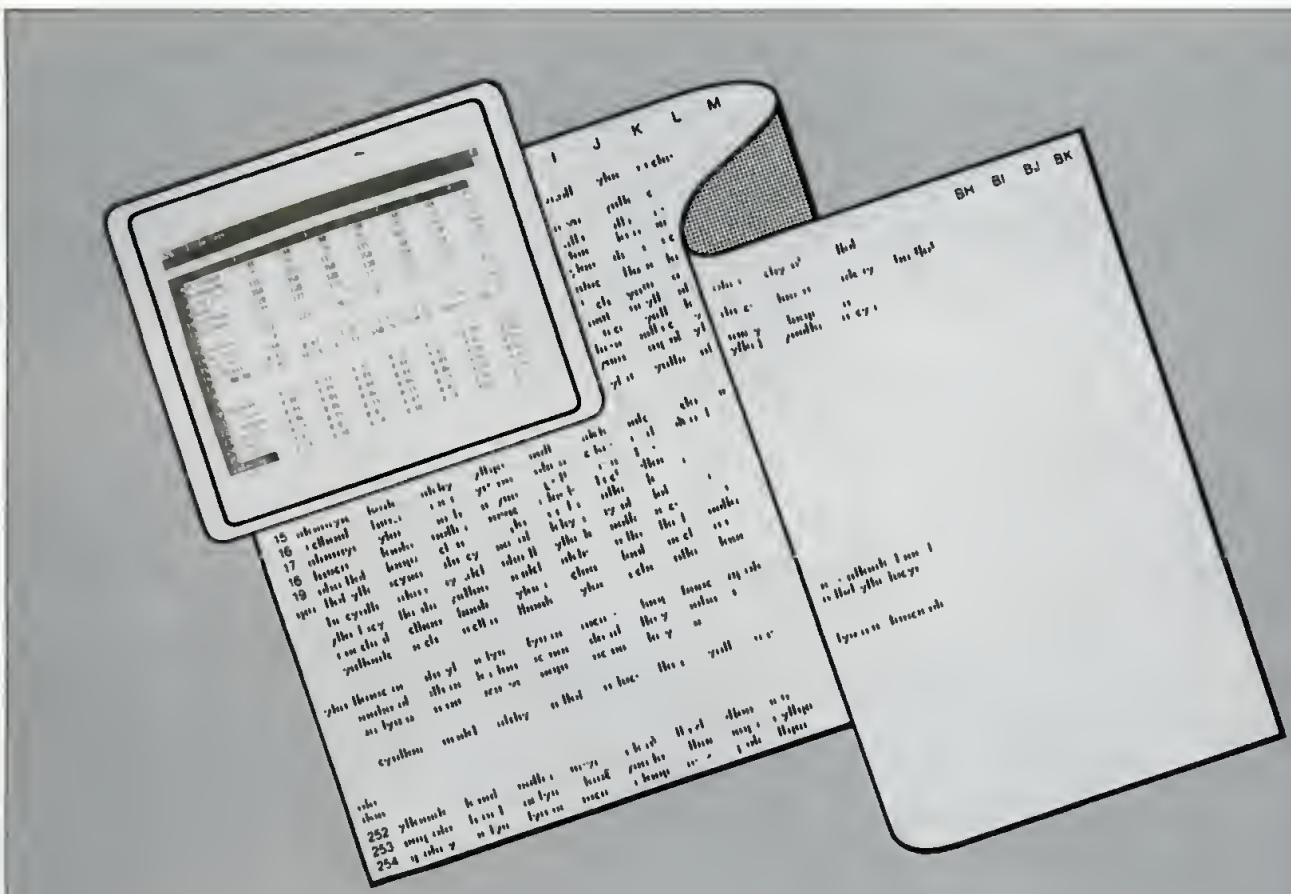
types of bar graphs. The graph is drawn into a single cell, but since a chart is much larger than a single cell, MBA has a way of exploding the size of cells to display charts in up to four special windows on the screen.

MBA has a procedure for Inserting charts and spreadshaets into a writtan raport, but before a spreadsheet can be insertad, it must first be "combined" into a single cell. This doesn't affect the spreadsheet itself; it just copies tha information from the range of cells (in our case A1 to C11) to a single cell so it can be edited into the raport. Combining is dona by moving tha cursor to an empty call and typing /K followed by the range of cells to be combined.

With Context you can write the entire document (up to 8,000 characters) in one cell. You anter the word-processing editor by typing /CW. The screen clears and the call is expanded to accapt anything you care to type in.

As indicated earliar, tha data base managament portion of the program is relativaly basic. It does allow you to search, sort, and otherwise manipulate the information from the spreadsheet. If we wanted, we could use the data base context to reorganize the spreadsheet in alphabetical order, or sort it so the highest expense is at tha top.

—*Lowrence J. Magid*



Functions

Provide common formulas for use in values. Each function begins with @ followed by the name of the function; most functions also require an expression in parentheses (the argument). An argument includes the values (formulas and numbers) upon which the function calculates.

The arguments may be:

v	any legal *VisiCalc* value.
l	any logical value.
list	any combination of values and ranges separated by commas.
range	a portion of a row or column specified by its beginning coordinate, a period (displayed as an ellipsis), and its final coordinate.

@ABS*(v)*	Absolute value of *v*.
@ERAGE *(list)*.	Average of the non-blank entries in *list*. Maximum of 255 entries in *list*.
@COUNT *(list)*	Number of non-blank entries in *list*. Maximum of 255 entries in *list*.
@EXP*(v)*	Natural exponent of v.
@INT*(v)*	Integer portion of *v*.
@LN*(v)*	Natural logarithm of v.
@LOG10*(v)*	Base 10 logarithm of *v*.
@ MAX	Maximum value in *list*.
@ MIN *(list)*	Minimum value in *list*.
@NPV *(r.range)*	Net present value of the cash flow in ronge, discounted at the rate specified i in the expression dr (discount rate).
@SQRT*(v)*	Square root of *v*.
@SUM *(list)*	Sum of the values in *list*.

Trigonometric Functions

All angles are in radians.

@ACOS*(v)*	Arc cosine of *v*.
@ASIN*(v)*	Arc sine of v.
@ATAN *(v)*	Arc tangent of *v*.
@COS*(v)*	Cosine of v.
@SIN*(v)*	Sine of v.

@TAN(v)	Tangent of v.
	Search Functions
@CHOOSE (v,list)	Returns the vth element of list. If v is greater than the number of elements in list, NA is returned.
@LOOKUP (v,range)	Compares v to the successive values in range and returns the corresponding value from the column or row immediately to the right or below the entries in range.
	Functions Without Arguments
@ERROR	Makes all expressions referencing the value display ERROR.
@FALSE	Logical value FALSE.
@NA	Makes all expressions referencing the value display NA.
@PI	3.1415926536.
@TRUE	Logical value TRUE.
	Logic Functions
@AND (list)	TRUE if all values in list are TRUE, otherwise FALSE.
@IF (l,v1,v2)	v1 if l is TRUE; v2 if l is FALSE.
@ISERROR (v)	TRUE if v is ERROR, otherwise FALSE.
@ISNA(v)	TRUE if v is NA, otherwise FALSE.
@NOT(l)	TRUE if l is FALSE, FALSE if l is TRUE.
@OR(list)	TRUE if any value in list is TRUE, otherwise FALSE.
	Logical Operators
<,>,=, <=, >=,<>	Compares two numeric values and results in either the logical value TRUE or FALSE.

screen displays columns F through M and rows 1 through 20, with M1 highlighted as the active cell in the upper right corner. If another command is then given to GOTO M30, the screen displays columns F through M and rows 11 through 30, with M30 highlighted in the lower right corner.

SC, on the other hand, always places the specified GOTO cell in the upper left corner of the screen. (Using the examples above, the first command would display columns M through T and rows 1 through 20; the second command would display columns M through T and rows 30 through 49.) The problem with this approach is that the cells to the right and below your selected cell are frequently blank; the cells you usually need to refer to are the ones above and to the left of your selected cell. Unfortunately, SC transforms the GOTO command from a handy utility into an unexpected inconvenience.

Calculating and Functions

Figure 3 shows the 31 functions available with VC, including standard arithmetic and trigonometric functions; Boolean or "logical" functions that make "IF... THEN," "AND," and "OR" decisions; indexing functions that look up or choose values; and functions for detecting calculating errors or data that is not available.

SC duplicates all of these, with the exception of the @CHOOSE function and the two logical functions @ISERROR and @ISNA. (The SC commands are identical to VC's except that they are not preceded by the @ sign.)

The VC logical functions return their results with the words "TRUE" or "FALSE" displayed in the cell, while SC displays a value of 1 for true and 0 for false. It is therefore possible to include the results of the SC logical functions in numerical calculations (e.g., calculating the sum of four logical functions).

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The VC functions @OR and @AND can operate on a list of arguments (e.g., @OR(A1<2,B1<2,C1<2) returns the logical value TRUE if the value of any of the three specified cells is less than 2). The SC counterparts of these functions accept only two arguments. Functions that are duplicated by the two programs appear to work idantically.

Functions and formulas are referenced a little differently by the two programs. VC uses an elipsis (entered by typing a single period) to indicate a range of cells, such as "A1...A6." SC uses a colon as the separator—"A1:A6"—which is slightly more troublesome to type because it necessitates the use of the SHIFT key. SC also requires that you close the parentheses in an expression such as "SUM (A1:A6)"; otherwise you get a "FORMULA ERROR" message.

In VC you can enter the active cell reference in an expression by hitting the ENTER key; the SC command for this feature is a comma. VC permits you to use the cursor keys to identify other cells of the worksheet and then antar them as entry references; SC lets you do this as well, but through a more complicated system in which the ESC key toggles on and off the cursor-referencing function.

VC also provides a way to convert a cell reference to its calculated value, by entering a # sign; this feature is not supported by SC.

Speed

To test calculating speed both programs were put through a rudimentary "torture test" in which each cell calculated the value of a preceding cell times 1.01. The only data entry cell was A1. From that, the same relative formulas were replicated over and over. The complete test involved over 3,000 multiplication operations and the addition of well over 6,000 numbers in over 150 operations. The results: VC's calculation time for the entire worksheet—2 minutes, 6 seconds; SC—1 minute, 16 seconds. With both programs calculation times were not affected by the formats in which the cell values were displayed. (SC did calculate each cell to 16-digit precision, vs. VC's 11.)

Admittedly, this torture test is both limited in the scope of the functions tested and unrealistic in its huge dimension. Unless you are calculating tide tables for the year, you are unlikely to require a matrix of this size. Nevertheless, SC can apparently add and multiply in about 68 percent of the time it takes VC.

Every time a new entry is made (value or formula) on VC the entire worksheet is recalculated. This process can cause noticeable delays when entering data into a substantial worksheet. SC, however, provides as one of its global options the ability to suspend calculation with each new entry, permitting entry of new data without delays. When in this manual recalculation mode, the worksheet can be recalculated at any time by giving the "!" command. This feature can speed up working routines with even a moderately sized worksheet and is a much more important advantage than raw calculating speed.

EVERY TIME a new entry is made (value or formula) on VC the entire worksheet is recalculated.

VC does provide one compensation for its relatively slower performance by supporting the buffering of data entry. If you enter data when the program is in a pause state and while recalculating the worksheet, any data you type (up to 33 characters) will be preserved in the keyboard buffer and entered once the recalculation has been completed.

SC does not support keyboard buffering. If you enter numbers during recalculation, they can be lost, resulting in fragmentary and incorrect entries. This could happen even if, to your eye, recalculation is taking place almost instantaneously. You either have to proceed cautiously when working or always disable the auto-recalculation feature when entering data. Auto-recalculation is the default setting for the program, so you have to consciously select the manual recalculation option.

Storage and Output

Both programs allow you to store and later print, send, or reload the worksheet in either its operational form (with formulas preserved) or as calculated values only. The two programs go about this in radically different ways, however.

With VC, a decision about output must be made at the time the file is to be saved, but several options exist. The worksheet can be "Saved," under the general "Storage" command, which writes the entire worksheet image to disk in a form reloadable by the VC program. Another storage option is the "DIF" format, invoked with a "#" command. This stores all or part of the worksheet in a form that can later be reloaded into another worksheet or by other programs. (The # sign is also used during worksheet operations to display the calculated values of cells.)

Other VC storage options are invoked by the "Print" command. All or a portion of a worksheet can be printed on the printer, just as it is displayed on the screen, or the worksheet can be "printed" to a disk file, via the "Files" subcommand. The file so created becomes a standard DOS file that can then be copied or printed as any other DOS file. (If this explanation is difficult to follow, it's because VC's storaga and output systems are not very well integrated even though they can accomplish most necessary tasks.)

SC's approach is somewhat more straightforward. There is a "Store" command that allows you to save all or a specified portion of the worksheet to disk in tha SC program format, a "Load" command that allows you to load all or a specified part of a previously saved file into the program, and an "Output" command that allows you to print all or a portion of the worksheet on a printer or write it to disk as a DOS text file. The Output commands give the options of printing or writing either the "contents" of the worksheet (with formulas intact) or the "display" of the worksheet (calculated values only). First-time users will probably find SC' terminology easier to understand.

With VC the upper left corner of the worksheet to be Saved or Printed is based on the active cell at the time the respective command is given, and the lower right corner is specified as a second coordinate. SC again takes a more direct approach, asking you whether you want to save "All or Part" of the worksheet and then prompting you for the coordinates of the partial save if you make that choice.

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An embellishment provided by *SC* is the option of printing the worksheet column and row border designations as part of the output. Unfortunately, the program default is to print this border, so you have to remember to disable the border display before outputting if you want to print just the worksheet information.

Both programs provide a way for checking which files are on your disks during loading operations. *VC* lets you display the disk file names one by one on the Edit Line by using the CURSOR RIGHT key. *SC* allows you to display all files in a directory format while in the midst of a Load command. It's unfortunate that this directory disappears from the screen before you can enter the file name you want to load.

Our torture test revealed some interesting specs on the storage and loading capacities of the two programs. When initially booted into the PC, both programs appeared to have used 42K of memory. (Both programs indicated that our 256K test computer had 214K of memory remaining.) Loading the *VC* test worksheet used up another 94K of memory; loading the *SC* version of the same worksheet used an additional 140K of memory. This extra memory load for the *SC* program is proportional to its extra digits of precision (11 vs. 16).

Despite the larger size of the file, *SC* was able to load its test worksheet in 1 minute, 3 seconds, while *VC* took an agonizing 4 minutes, 52 seconds to load its smaller-size (in K) worksheet with the same data. Since each program performs one recalculation immediately upon loading, it took 2 minutes, 7 seconds to have the test up and running on *SC*, while it was 6 minutes, 25 seconds before we could begin working on *VC*.

Documentation

Electronic worksheets involve complex, detailed functions and commands, so good documentation is a crucial part of the program. Both *VC* and *SC* provide three-step documentation, starting with a brief introduction to general worksheet concepts followed by a series of tutorials in which the user constructs sample worksheets. It is highly recommended that anyone using a worksheet for the first time proceed through the tutorials before plunging in and working with either of the programs.

Both manuals also include a detailed reference section to all the program commands, as well as separate reference cards to all the commands.

Although both manuals present complete and useful reference material, users will find *VC* documentation to be generally more extensive, better organized, and more professionally produced. *VC* documentation may appear a bit more formidable to the first-time user, but it provides a more orderly and thorough introduction to its program as well as more accessible reference and a much more usable index. This judgment is certainly influenced by an excessive number of typographical errors in the *SC* manual, as well as the fact that the documentation provided was CPM-80-oriented, making no mention of the PC's operating system or function keys.

OUR TORTURE test revealed some interesting specs on the storage and loading capacities of the two programs.

SC does provide an on-screen Help feature; at any decision point in the program, you can type a question mark or F1, and the screen will display a summary of concepts relevant to the portion of the program in which you're working. Although the notion of "context-oriented" assistance is appealing, most users will probably want to consult either the printed reference card or the manual when they're not sure how to proceed.

One glaring deficiency in the *VC* documentation must be noted: The "DIF" format for storing worksheet information is explained in a separate appendix, and then in needlessly technical language. This storage option is the only way information can be transferred from one *VC* worksheet to another (or within a single worksheet) and needs to be explained simply in the main reference section. As it is currently presented, users are likely to assume this concept is useful only to advanced programmers, which is not the case.

A Split Decision—Two Winners

If you've followed through this feature-by-feature comparison, you'll realize we're not going to recommend you choose one program over the other. The choice should be based on your personal tastes, needs, and expected applications. We can, however, offer a few general conclusions and one important recommendation. First, despite our cataloging of occasional shortcomings and inconveniences, both programs are excellent. They both do the job they are designed to do and do it very well. If you're already working with either program, you will probably gain little real functional advantage by switching; any gain would be primarily in terms of streamlining your working routines and extending program capacity and/or performance.

In general, *SC* outscores *VC* in terms of formatting options, precision, and speed of execution. It might therefore be your program of choice if you anticipate constructing elaborate worksheet models with complex or large volumes of data.

VC is somewhat more elegant in its presentation and provides a smoother user orientation with fewer traps and sharp corners. It might therefore be your preferred program if these "style" intangibles are of more importance than specifications.

Speaking of style, compliments must be paid for the very stylish and classy way in which *VC* version 1.10 was automatically sent to all PC owners who had purchased version 1.00. VisiCorp has recently announced an advanced version of VisiCalc, which reportedly will utilize data files created by the current version.

We should also note that these two programs are not the only electronic worksheets presently available, or soon to be available, for the PC. The best way to become conversant with worksheet concepts is to spend an afternoon at your local software shop comparing another program with one of those reviewed here. And stay on the lookout for more worksheet programs during the coming months.

If you've not yet played with an electronic worksheet program on your PC, we can unequivocally recommend you find some way to experience one of the most wonderful and innovative microcomputer concepts yet devised. ***/PC***

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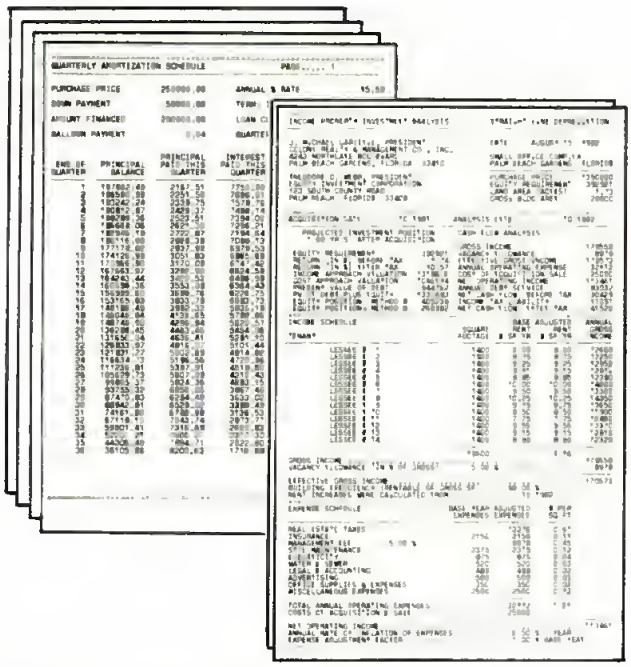

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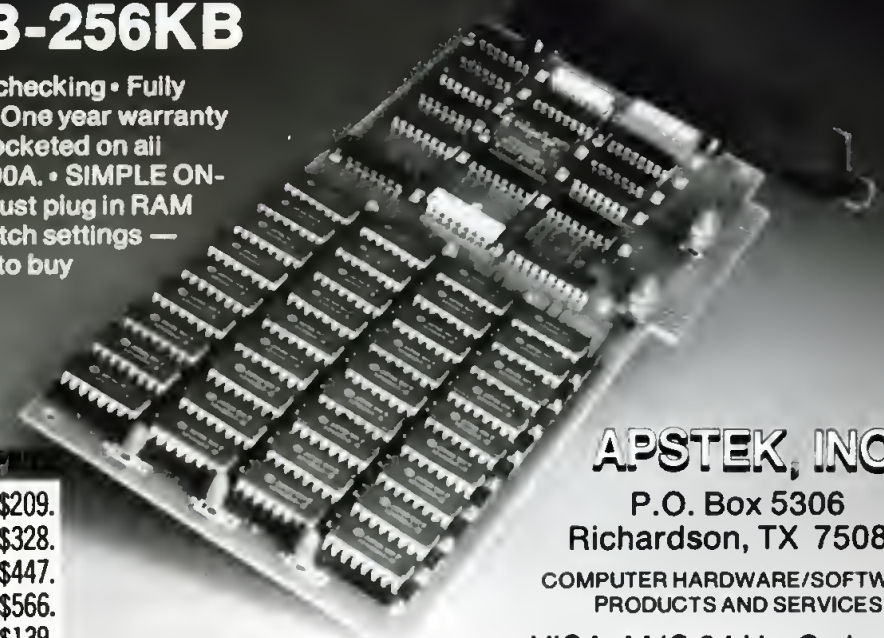

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The Challenger: Multiplan

PC previews Microsoft's new spreadsheet program.

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The next combatant in the PC Calc Wars may descend from the Northwest. In Bellevue, Washington, a new, angular, two-story building is faced with beige stone and Darth Vader windows. Inside, Microsoft Corporation is readying its calc challenger, *Multiplan*. We flew there for a preview and came away impressed.

Jeff Raikes, Microsoft's manager of product marketing, readily admitted that *VisiCalc* and *SuperCalc* were thoroughly studied in developing *Multiplan*, which was certainly apparent by the fact that it includes virtually every one of the formatting and calculating functions of its predecessors, and then throws in a few more to try and claim a competitive edge.

THE BATTLE gear, though extensive, isn't nearly as impressive as the warrior underneath it all.

A quick comparison of the formatting options revealed the added ability to center numbers or text within a column and to specify the degree of decimal accuracy with which values are displayed. A few arithmetic and logical functions have been added, such as standard deviation, modular arithmetic, rounding, and an expanded look-up function.

Multiplan also makes gestures towards being a text calculator. Logical functions and calculations are possible with label entries (such as calculating the length of an entry and returning specified characters from an entry). There's even a utility that will sort any column (maximum 255 entries) of labels or values in alphanumeric order. For a final, flashy weapon, *Multiplan* lets you create eight separate windows on the screen.

The battle gear, though extensive, isn't nearly as impressive as the warrior underneath it all. *Multiplan* has been conceived with features that take the worksheet concept significant steps further. In the brief time we had to play with the program, here's what caught our eyes.

Multiplan lets you "name" cells or blocks and then use those names in formulas. Suppose you have listed several sales items in cells B1 through B4: You could name those four cells, as a column, "SALES." Then, in cell B5, you could simply enter the formula "SUM(SALES)."

Names can also refer to blocks of cells. If "SALES" were used to identify monthly items spread across columns B1:4 through N1:4, you could enter the "SUM(SALES)" formula in B5 through N5 and a separate total sales calculation would be made for each column in the range. Those totals could then be named "TOTAL SALES" as

a block and used in other formulas. By choosing names wisely, you can almost instruct the program in English rather than using formulas.

Another cell-referencing option is to write formulas that operate "relatively" to another cell. You can instruct the program to subtract whatever cell is four rows up and two columns to the left from the call four rows up and three columns to the left, without actually naming or specifying those calls. This system is conceptually a bit more abstract than the VisiCalc and SuperCalc method of specific references, but it dispenses with having to make "absolute/relative" choices when replicating formulas.

We used letter/number indicators abova to refer to cells, but the Multiplon program doesn't use this convention. Instead, it refers to both rows and columns by number. So the cell in the fourth row, five columns over is called "R4C5." This system is a bit cumbersome and strange at first, but it integrates well with the rest of tha program functions, particularly the ralatlva referancing system.

Tha other impressive feature is the program's system of "proposed responses." It keeps track of what you are doing while you're working on tha worksheet and tries to anticlpate your next cholce. If you coplad the contents of one cell into multiple columns, for example, Multiplon would propose the same number of columns on subsequent rows. At any time you can choose the proposed response by hitting the ENTER key, or override it by typing in an alternate value.

When we first read about this proposed response feature, we were extremely skeptical. In practice, however, it turned out to be remarkably accurata. We found that it correctly anticipated what we wanted to do about 75 percent of the time, and that tha feature quickly proved to be a convenience rathar than an lmpediment.

(If you worked with this program for a while, you would eventually adjust your work habits to fit the program's proposed responses. We thus irrevocably enter tha Brave New Age of Machines, in which the machine trains users to work in lts preferred style. The resulting partnership can be rewarding and productive, but it places great responsibility on program designers.)

In general, the program, though more elaborate and complicated than VisiCalc and SuperCalc, remains extremely "congenial" (Microsoft's word), due in great measure to the guidanca of Charles Simonyi, Microsoft's manager of the End-User System Software group. Blending his native Hungarian with an inquisitive command of English, he described the program as being "guarded by dogs that don't bark." In other words, Multiplon tries to assist the user through a complex set of commands while remainlng as inconspicuous as possible. We did find that although the program presented new concepts, it was fairly easy to negotiate. The extensive documentation, which we saw in prerelease form, was carefully and thoroughly prepared and not difficult to follow.

WE FOUND that it correctly anticipated what we wanted to do about 75 percent of the time.

In the storage and output department, Multiplon offered anothar new feature—the ability to "link" separate worksheet files. For axample, suppose you had craated worksheets for different divisions of a large company, each containing sales and cost data. You could prepare a third worksheet summarizing all company operations, and in it link certain cell values to the sales and cost data in the division worksheets.

The links would exist as commands resident ln the main worksheet, and the division sales and cost data would be automatically entered into the appropriate cells of the main worksheet when it was loaded. If the division worksheets were subsequently updated, the updated information would be entered into the main worksheet the next time it was loaded and run. Thus, a network of multiple supporting worksheets can be created without the need to ra-enter data from one to the other.

Multiplon also offers a printing function that allows you to specify page dimension and margin settings based on your printer's capacity. It will then automatically print an entire worksheet in segments that can later be pieced together into a single printed document.

We were relieved to discover that Multiplon has laid to rest the "order of calculation" conundrum that has been the bane of VisiCalc and SuperCalc users. If a worksheet contains forward references, Multiplon automatically performs as many recalculations as are necessary to display a correct value in each cell. Multiplon handles numbars with 14 digits of precision, which can be raised or lowered to the 63rd power.

The most glaring limitation of the program is the fact that it can use only 64K of working memory. We weren't able to test what this actually meant in terms of storage or working capacity, but Jeff Ralkes claimed that the program used a compressed method for storing data. He also pointed out that tha linking feature obviated the need for huge worksheets.

We weren't able to test calculating times for the program. Our impression was that it compared respectably with other worksheet programs. Speed, however, would not be one of its crowed-about faatures. More extensive benchmark tests will have to wait until a version of the program for the PC is raleased publicly. (Our demonstration varsion of the program was up and running on a PC.)

When can we expect Multiplon to be available for PC owners? Microsoft will be releasing its version of the program late this summer. The program is designed to run on MS DOS, the operating system developed by Microsoft for the PC ("IBM PC DOS"), but Microsoft has indicated that it will be distributing its own version for only a dozan or so non-IBM computers that also run on MS DOS. We're betting that a PC version, released by someona other than Microsoft, will soon appear on the market.

How hard are the Calc Wars going to be fought? We noticed that the Multiplon "Transfer" command presents three format options for loading files, the third of which is euphemistically called "Other." And what does this Other command do? It takes VisiCalc worksheet files and transforms them—labels, values, formulas, and all—into files that can be used by Multiplon. The Northwest winds of war do blow strongly. */PC*

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Mega Forces U·N·I·T·E

The saying goes that if you can keep your head while all those around you are losing theirs, you probably don't understand the situation. Shortly after IBM announced its initial personal computer dealer network, the trade press quoted many computer and electronics retailers as pooh-poohing the idea of Sears selling a high-tech and high-ticket item like the IBM PC. These dealers were thinking about Sears Roebuck & Co., the predominantly self-service mega-retailer of everything from lawnmowers to lingerie—everything but a $1,600-and-up personal computer.

What the nay-sayers didn't know was that coincident with IBM's dive into personal computers was a Sears experiment to bring its retailing and service expertise to the business/professional personal computer market with stores carrying a special name and a different image—Sears Business Systems Centers. The experiment was apparently a success; the five original test stores are projected to blossom into 45 new ones by the end of 1982, with a network total of 200 stores by the end of 1984.

New Business, New Image

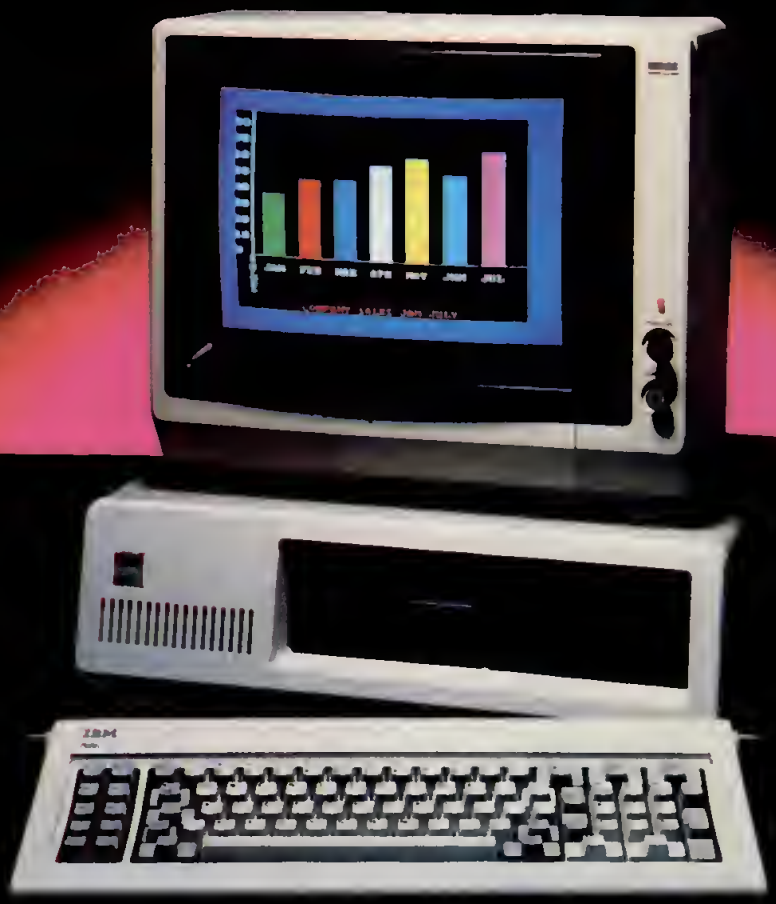
The most striking element of the Sears Business Systems Centers is the professional image. "It's a completely new enterprise targeted to a different public," according to a Sears spokesperson. "From store layout to color scheme the centers lend themselves to the sale of sophisticated equipment to business people."

Approximately half of the showroom floor is devoted to personal computers, electronic typewriters, and stand-alone word-processing systems. During the initial test, the centers offered the IBM PC, the NEC PC-8000 series, a Vector Graphic personal computer, the Wangwriter, and electronic typewriters from Exxon and Olivetti. The balance of the selling floor is dedicated to desk-top and professional hand-held calculators, telephone accessories, dictation equipment, photocopiers, and computer software and supplies. Away from the equipment displays are a separate training room and a semi-enclosed customer conference area.

Customers who expect an environment similar to Sears' general merchandise stores are frequently surprised to see the carpeted, uncluttered Business Center showroom. It is decorated more in keeping with a modern office than a retail store. "When some people look through the window, they give a double-take at the sign overhead, to make sure they're actually at Sears," said Jim Liermann, manager of the Arlington Heights, Illinois store. For its computer displays along the center aisle, Sears has individual work stations set up

Illustration: Jack Desrocher

Your IBM personal computer deserves an Amdek Color-II monitor



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with room for two comfortable chairs and ample work space. This arrangement allows for easy one-on-one communication with salespeople even when the store is crowded. Other computer displays pop up from time to time. On a recent visit to the Arlington Heights store, three IBM systems with various peripherals were up, running, and awaiting demonstration.

The Sears Business Systems Centers evolved from the experience Sears had with home computers in its general merchandise stores only a couple of years earlier, such as with the Atari 400. The results from that early foray into computers were not encouraging. The home computer market, Sears executives learned, had not yet developed.

Further research indicated a growing demand for small business and professional level computers—enough demand to support a $5 billion industry by 1984, they surmised. They also observed that selling business-oriented computers required professional salespeople acting more like consultants. "It takes extended selling time and a special environment without the distractions of a [general merchandise] store's walk-through traffic," a spokesperson added.

Another key element favoring the decision to open freestanding centers was that Sears' full-line stores were not necessarily located in places that catered to the professional and small-business clientele. With independent stores Sears Business Systems Centers could be targeted geographically to potential customers. But, as Liermann noted, customers are still having trouble breaking old habits: "A new customer will call and ask us where we are in the store so he won't have to hunt around for us."

Product Philosophies

One of the principles behind the product assortment is that the Sears Business Systems Centers' products start where the office equipment lines in the full-line stores leave off. For example, the top-end Sears electric typewriter in the general merchandise stores is the starting product in the Business Centers, with the line progressing from there up to electronic memory typewriters.

With personal computers the general merchandise stores take care of the home market with Atari or Texas Instruments type products and the Business Centers start with the more business-oriented NEC PC-8000 and CP/M software. In the test stores' computer line-up, the NEC is joined by the IBM and then up to single-user Vector Graphic desk-top systems. The emphasis is on personal computers rather than on multi-user systems, which require on-site support.

Nine months after the "go ahead," the first two of five test stores opened in the Chicago suburbs (Villa Park in the west and Arlington Heights in the northwest) on October 7, 1981, almost simultaneously with IBM's release of the PC. Three other stores followed immediately: one in Burlington, Massachusetts (suburban Boston) and two in Dallas, Texas.

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IBM Takes the Lead

"The first weeks were hectic," Liermann recalled. The Sears centers seemed to have access to sufficient quantities of IBM equipment. It was common to see stacks of IBM PC cartons in the window.

At the Arlington Heights store, sales of the PC were brisk, both from walk-in business and long-distance phone calls. The training room became the staging area where PCs were configured and tested for each customer prior to delivery. "We were doing all we could to get systems ready and out," Liermann said. "We had several customers fly their private planes to Palwaukee airfield, pick up their PCs, and fly back out again. That still goes on today."

WITH 45 stores opening this year, Sears will be on the lookout for people to staff stores all around the country.

John Purtell, national manager of the Sears Business Systems Centers, reinforced what is evident from a visit to any store: "The IBM Personal Computer is the lead item and focal point in the centers." Another spokesperson assured us that the PC was their strongest selling computer. The typical system going out the door is equipped with 64K RAM, two disk drives, monochrome display/printer adapter card, monochrome display, and the RS-232 card.

Liermann has seen a change in the types of PC customers since the opening. At first the rush came from hobbyists and people interested in developing software for the machine. Since then, apparently most of the hobbyist and software groups already have their machines, and now the majority of systems are going into small businesses. Very few are going home, except in the case of an executive who may use a *VisiCalc* program at home or access his company's computer via telephone. With the lack of home-oriented software, this trend is not surprising.

One criticism of the Sears Business

Systems Centers was that the centers carried only IBM software and peripherals. The sales staff was usually aware of other offerings but simply did not have them to sell. According to John Purtell, that won't be the case for long. He noted that all the elements of the test stores, including product mix, were under test and had to remain fixed. With the Sears Business Systems Center program expanding, he indicated changes and additions to the product offerings "with store number six." Everyone was tight-lipped as to what those additions might be.

As with the Sears general merchandise stores, new products are evaluated thoroughly before being offered for sale. In the Business Centers everything from documentation to packaging to functionality gets a hard review by Sears' own laboratory in Chicago, internal data-processing, and, frequently, outside testers.

Customer Support

All this testing is aimed at protecting the customer from products that may not perform to specifications, as well as protecting Sears from unhappy customers. If you have ever experienced a problem with a product purchased at a Sears store, you know that Sears, the manufacturer, or both, get involved to make sure the problem is corrected. That's all part of Sears' "satisfaction guaranteed" slogan—perhaps one of the most important elements carried over to the Business Systems Centers.

The management at the centers seems to be quite sensitive to customer satisfaction with the IBM PC, even during the difficult times of a new, continually evolving product. An excellent example is the promotion run by the centers just after IBM released the double-sided disk drives. Large ads in the Sunday Chicogo *Tribune* business section announced that for a limited time the original IBM drives could be traded in for new double-sided drives for only $200 each.

In the case of the infamous *EosyWriter*, however, the IBM-brand-only policy during the store test period prevented Sears from helping its *EosyWriter* customers get any relief on updated offerings from IUS. This policy may change with the broadening of product lines this summer.

Over and above the Sears policy of guaranteed satisfaction, each store has considerable flexibility in the extra support it chooses to give its customers.

Learning center room for instruction in machine operation and business problem solving.

COINCIDENT WITH IBM's dive into personal computers was a Sears experiment to bring its retailing and service expertise to the business/professional personal computer market.

The Arlington Heights store, for example, decided to produce its own newsletter to keep purchasers up to date on new software offerings and operating tips the salespeople pick up along the way. One recent issue included some advanced *EosyWriter* tricks submitted by a customer.

Unlike some computer stores in which you get the feeling you're welcome only if you've got some cash burning in your pocket, there's no limit to the time a customer can come back to Sears for basic help with a system. "We encourage people to call us long after the purchase," Liermann said.

And come back they do. Customers of all technical levels come in to share successes and problems with equipment or software. To help get interested parties together, the store offers its training room and equipment to a PC users' group that meets informally one evening a month after closing. The store may eventually set up a PC for an after hours, dial-up computer bulletin board for an IBM PC idea exchange.

A computer literacy seminar is another extracurricular activity for this store. When a sign-up sheet at the door hits about 20 people, the store staff schedules a free, 2-hour, no-selling introduction to some of the technical aspects of personal computers for laymen. The goal is to help guide the attendees to making intelligent purchase decisions. Ona added benefit, Liermann said, is that " it reminds us not to assume a higher level of knowledge,"

which comes from working with regular customers daily.

Sears is known for its service, and the Business Centers are no exception. The centers' service network benefitted greatly from Sears' experience in training technical people and maintaining a service and parts inventory system—elements that are prone to flounder at a new computer retailer. Many IBM service problems are handled at the store by sales staff running the advanced diagnostics. If a card or peripheral is faulty, it can usually be swapped immediately for a good one in stock.

With 45 stores opening this year, Sears will be on the lookout for people to staff stores all around the country. We asked John Purtell what qualifications Sears is seeking in prospective employees. For both managers and sales staff "a high level of computer knowledge is not a prerequisite. We'll teach them computers," he said. More importantly, store managers should have a solid retail management background. For salaspeople "selling comes first, preferably experience in selling to the business customer."

Extensive training will be provided.

CUSTOMERS who expect an environment similar to Sears' general merchandise stores are frequently surprised.

The staffs of the original five stores received training in Chicago and at some manufacturers' sites, including IBM's Boca Raton facility. But all future training will be consolidated in Chicago for an intensive 9- to 10-week program. Follow-up sessions are held frequently at the stora level to keep salespeople up to date on new products, software, and applications.

Perhaps it was the happy coincidenca of Sears and IBM getting into personal computers that propelled the Sears Business Systems Centers into their current growth curve. Being in the right place at the right time with the right product line is one sure way to success. But Sears Business Systems Centars also have the support mechanisms (service, training, market research) to keep them going.

Only 1 year ago who would hava thought Sears would be where America shops for IBM? */PC*

Donny Goodmon hos written obout home electronics since 1979. His orticles have oppeored in Playboy, Science Digest, ond Radio-Electronics mogozines. He has owned his IBM Personol Computer for 6 months.

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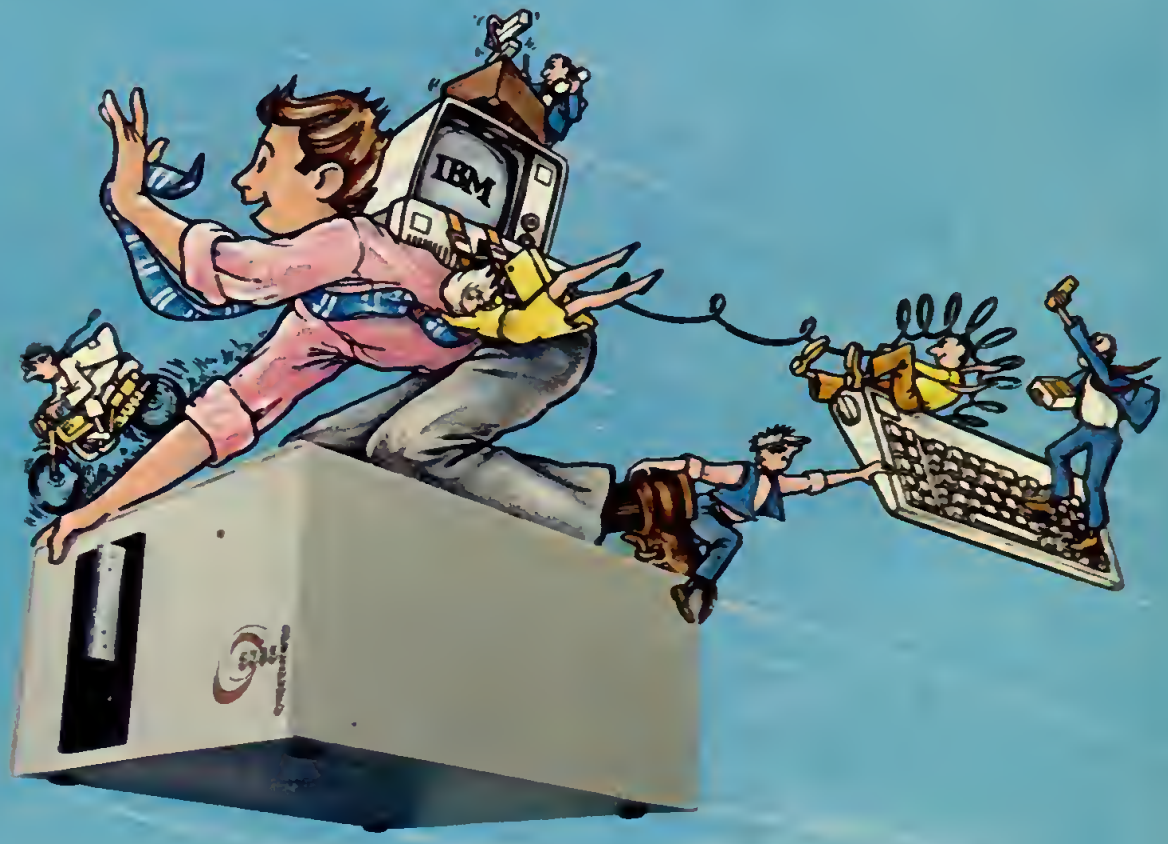

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EDITED BY SUSAN KELLER

Club News

Clubs, bulletin boards, and newsletters enable PC users to capitalize on their fellow users' knowledge.

News, Discounts, and More

PERSONNA Computer Association is an international organization that offers its members discounts of 10 to 30 percent on supplies, peripherals, and software. Its monthly newsletter, Personnality, features news of compatible products and software. PERSONNA has developed a "Starting From Zero" training kit for first-time users and is planning to initiate an economical hot line.

In addition to opening three new chapters in Texas, California, and Canada, it is presently negotiating with England, Switzerland, Spain, and Italy. Potential chapters are also being coordinated in Calcutta and Hong Kong. Member Bill Maxwell says, "We hope to close the year with a big, red line eround the globe."

September 8-11 PERSONNA will hold its annual national convention and products exhibition in Atlantic City. A "PC Plus One" birthday party on September 9 at the Golden Nugget Casino and Hotel will feature a PC-shapad birthday cake. Speakers from Microsoft, Sorcim, Innovative Software, and several other firms will attend.

Club membership is $45. Contact PERSONNA, P.O. Box 759, Point Pleasant, NJ 08742.

The Capital PC User Group

Peopla join user groups to gather information and find solutions to their problems. Such groups had been activa in tha "large" computer industry well bafore the introduction of microcomputers. An IBM mainframe user group called SHARE has been in existence for many years.

In the microcomputer community user groups have sprung up to support everything from specific system architectures (S-100 Clubs) to operating systems (CP/M Users' Group) to printars (Epson MX Users' Groups). IBM PC user groups are now forming ail around the country. Their speed of growth and size is indicative of the great interest in the IBM system.

Over 140 people attended the May meeting of The Capital PC User Group in the Washington, D.C. area. Many members had come directly from work, still wearing three-piece suits or military uniforms. More than 30 women ware in the crowd—a much higher percentage than at TRS-80, Apple, CP/M, and othar user group meetings in the same area. The club has a broader base than those associated with other machines: Members' occupations included medicine, law, the military, and several other agencies of the federal government. An informal member survey showed that only three members had PCs with less than 64K of RAM, about 80 percent had 64K, and a little under 20 percent had more than 64K.

The club has several special interest groups such as medical applications and communications. Other special interest groups are dedicated to software and games. At the general meeting the software group sponsored the distribution of disks that contained the 1.05 release of PC-DOS, the two-side and speedup utilities, and other programs. These disks also have a very cleverly written tutorial that takes the user through many of the programs and demonstrates the use of batch commands.

The May meeting was highlighted by a number of speakers, including a representative of tha IBM System Products Division in Boca Raton, a representative of the Boston PC User Group, and a publisher soliciting PC books and software. The special interest groups gave short reports, and vendors had various software packages and books aveileble for sale.

The most popular of The Capital PC User Group's activities is the IBM PCUG Bulletin Board Service. Run by Wes Merchant, the BBS is the first electronic messaga system dedicated to the IBM PC. The system (703/560-0979) runs 24 hours a day, 7 days a week. During its first 100 days of operation, the BBS received more than 1,850 calls.

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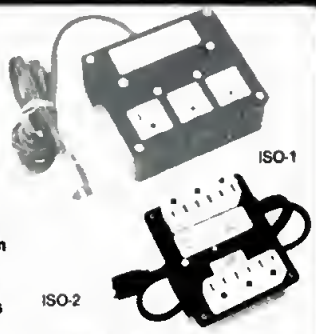

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Club News

Unlike many other community bulletin boards, which have become trading posts or specialized services, this one is both a users' notebook and a network. Signing on produces the friendly fare common to bulletin boards around the country: some introductory comments, the phone number of the system operator, and easy directions for using the service. Then one can scan, retrieve, add, or delete a message; check the user log; measure elapsed time on the system; chat; or download. The system's download capabilities allow users to receive public domain software over the telephone. At this writing the programs available were all modifications of and improvements to DOS and async software. Listed transfer times varied from 10 seconds to 5 minutes.

Each of the club's special interest groups maintains information areas on the bulletin board. These serve as prime sources of information on many aspects of the PC. Also listed are the names and phone numbers of other IBM PC user groups and bulletin boards around the country.

Of particular interest is a service called "Tips on the IBM PC (or what you should know about the PC but nobody took the time to tell you)." These tips include a wealth of succinct information about software, hardware, and peripherals (keyboards, memory upgrades, modems, and monitors, to name a few), programming, publications, supplies and accessories, and even a customer service number in Boca Raton.

User messages contain patches to software, modifications to hardware, comments on commercial programs, and news of related items appearing in the marketplace. Although someone is always selling an item, this bulletin board seems to be mainly an information utility and offers a great way to contact other members of the PC family.

If there is any complaint to be voiced about the Washington BBS it is connect time. The modem does the dialing (I used PC-TALK), but repeating the instructions 40 times does get old fast. It's not surprising that such a resource—which is, incidentally, free of charge except for the phone call—should experience heavy use. Others in this PC network have obviously known similar frustrations. Among the messages left on the bulletin board was notice of an automatic modem redialing program along with a user's comments that he cannot get on this BBS during weekends without it.

Those Washington area folks are providing a valuable service with their BBS, dissolving the miles and mitigating the problems associated with the PC. Considering the variety and usefulness of information available—patches and programs, technical tips and marketing news—the cost of the long-distance call was of little concern.

Anyone wishing to contact The Capital PC User Group should write to Capital PC, 13700 Beauwick Ct., Silver Springs, MD 20906.

—*Fronk J. Derfler, Jr. and Ellen Rony Wilson*

Autumn Monthly

Revolution, a monthly newsletter published by the Autumn Revolution Users Group, has a new editor, and a new look and format. Michael Rieke, the new editor, said the 8½- by 11-inch format will provide a very readable and distinctive look, beginning with the August issue.

The newsletter will continue to provide the latest information on hardware, software, new products, and events, as well as product evaluation. *Revolution* is written for both the beginning and the advanced IBM PC user who wants to get the most from his microcomputer.

For more information, write to Autumn Revolution, Department PC, 10981 E. 23rd St., Tulsa, OK 74008. —*C.H.*

PC magazine will publish a periodic listing of PC user groups and their activities. Drop a line to Club News, PC, 1528 Irving St., San Francisco, CA 94122.

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The Bithood Question

Power, practicality, and potential are worthy considerations when choosing a computer, but the size of your byte is still the thorniest issue in the industry.

Illustration: Mick Wiggins

Some things you just don't argue about if you want to keep your friends: politics, religion, and motherhood. With so many people buying personal computers, however, another subject may have to join that taboo list—the size of their computer's central processor.

Faint echoes of childhood seep into such comparisons: remembered arguments over fathers' jobs, brothers' strengths, and privates' sizes. "Eight bits is good enough for me"; "My 16-bit machine can beat your 8-bitter any old time"; or "My business has a 32-bit computer that's so-o-o fast."

Before taking sides, it helps to know what this is all about and why the bit size of microcomputer processing chips is a thorny issue in the industry.

Why Use a Truck to Move a TV Set?

To get an idea of the relative power of computers with different bit sizes, suppose you have to move your household furniture and have a choice of three different vehicles: a VW bug, a light panel truck, and an eight-wheel moving van.

The VW is the least expensive, the easiest to drive, and if you wedge things in pretty tightly or strap them to the top, it can probably hold a lot more than you'd imagine. Getting across town in it is easy, but loading and unloading are very time-consuming and many trips may be necessary.

The panel truck is much more efficient for hauling furniture than the VW, and loading and unloading are simpler. The truck costs more than the Volkswagen and takes a little extra skill to drive. Using one is worthwhile for a room full of furniture, but if your total payload is a TV set and one passenger, you're probably better off in the VW.

The moving van will carry all your furniture in one load, but very few people have the skill and a special driver's license to handle a big rig. The cost of buying or even renting a truck is much higher than smaller alternatives, and the extra money for hiring a professional driver may push the cost effectiveness beyond that of the VW or the panel truck. If you really need that much power, you are probably better off hiring a moving company. In this analogy the VW is an 8-bit, the panel truck a 16-bit, and the moving van a 32-bit computer. Eight-bit hardware and software are usually adequate for most purposes if the user has a little extra time for solving really complex problems. With a 16-bit machine a user can realize greater efficiency but at the price of higher initial expense and the time to learn how to take advantage of the machine's capabilities. As for the 32-bitter, while it is clearly superior to both the 8-bit bug and the 16-bit truck, it is a professional's tool requiring a substantial investment in hardware, software, and personnel to run it. Unless you need it all the time, you'd be better off hiring a computer service bureau to process your data.

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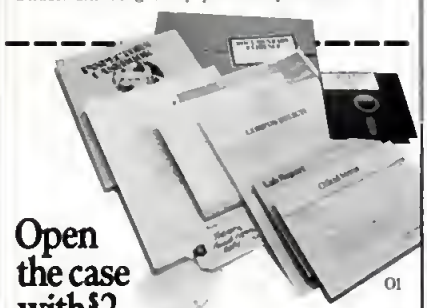

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There are really only ten of them, but a few thousand years ago the geniuses of civilization invented "places," and numbers became symbols for practically everything. The number 32 means two ones and three tens; the number 1,024 means four ones, two tens, no hundreds, and one thousand. Schoolchildren learn to add these places in their heads early in life, and sooner or later they recognize that each place represents numbers ten times larger than the place on its right.

We have ten fingers, a fact that probably suggested the use of ten possible numbers (the decimal system) to fill each place. But computers have only two "fingers," 1 and 0, and they are called bits. They represent whether an electrical state is on or off, or whether a charge is detected or not detected in a storage place. The binary system appears quite limited, but is actually quite useful if there are enough places, since each place is two times larger than the place on its right.

The number 101 in binary arithmetic means that there is one one, no twos, and one four, making binary 101 equal to decimal 5. The number 11111111 equals (1+2+4+8+16+32+64+128) or 255 [remember to read right to left]. In a computer memory that can hold just these eight places, the largest number it can store is 11111111 or 255. That number is the largest that can be represented by what most microcomputers understand as a byte—any combination of 8 bits [places], representing a number from 00000000 (0) to 11111111 (255). It is helpful to remember that 255 is derived by taking the eighth power of 2, and subtracting 1 from the product (2<8> − 1=255).

The designation of a processor chip as being 8-bit, however, refers to its ability to address 8 bits at once: to seek them out in memory chips, bring them in to be processed, and then send back new numbers for storage 8 bits at a time. It isn't the storage capacity of a computer that determines its bit size but its ability to perform calculations on those stored numbers. An 8-bit processor can work with numbers that are, in effect, eight places wide.

Most 8-bit microcomputers are set up to address memory chips that can hold 16,383 bits apiece (2<14> − 1). With eight such chips in a row, the computer can read 16,383 bytes, because each chip will contribute one of the eight places in the 8-bit byte. If there are four rows of these chips, the computer can find, read, write, and manipulate 85,535 8-bit bytes (2<16> − 1).

What? The numbers seemed awkward to computer scientists too, so early in tha development of digital computers they abbreviated the number 1,024 (2<10>) as K. Capital "K" stands for 1,024, to distinguish it from lowercase "k," which means 1,000 in metric designations. The number 85,535 is unwieldy, so it is usually written as 64K. That is the maximum number of 8-bit bytes for which an 8-bit microprocessor can find addresses.

Will You Hold Please?

Imagine yourself seated at a telephona switchboard that has eight outgoing lines. You have a directory with 64K names in it (the computer's memory) and you can make eight calls simultaneously (the processor). In a computer with 64K of possible memory locations, the ability to find any of them in any order or sequence is known as random access memory or RAM.

An 8-bit microprocessor is limited to 64K RAM. This configuration is adequata for most applications, and many first-tima users are impressed by the powor of 8-bit microcomputers, particularly for the tasks they previously had to do by hand. A good example is word-processing. With only 26 letters, ten numbers, and about 20 symbols on a typewriter keyboard, 255 8-bit bytes are more than enough to represent each possible character. There are enough bytes left over to represent commands such as "insert," "delete," or "move the cursor one space to the left." Most people cannot read faster than a few hundred words per minute, so the computer need not display a new screen more than once every few seconds. For really long pieces of text the computer may have to go back and forth from the disk, but most users either do not notice or do not mind the time lag; it's still much faster than trying to find something on paper.

There are some tasks for which 8-bit processing is inadequate. One of the most useful is graphics. To be effective, graphic displays should be made up of the smallest fragments (pixels) that the screen is capable of producing. This is called high resolution. (An ordinary TV set, by the way, cannot reproduce high-resolution graphic elements as clearly as a monitor can,

which is why most computar manufacturers recommend that users purchase monitors.) But generating high-resolution graphics requires the computer to have an address for every pixel, and to be able to refresh or change that pixel 30 times every second. There are simply not enough addresses in an 8-bit microcomputer system for all those pixels. As a result most graphics software for 8-bit computers is limited to low-resolution images (usually squares), or to the manipulation of predefined graphic elements such as circles, boxes, and lines, which the user can place anywhere on the screen. With an 8-bit graphics package, for example, a user may be able to divide a circle into segments for a pie chart but may not be able to break the circle or detach one of the wedges for emphasis.

THERE are simply not enough addresses in an 8-bit microcomputer system for all those pixels.

A 16-bit microprocessor, such as the one inside the IBM PC, can handle binary addresses up to 16 places long (such as 11111111 11111111) and can work with up to 262,143 (2<18> − 1) memory locations, abbreviated 256K RAM. This is good for high-resolution graphics, and there is enough memory space left over to hold instructions as to which color the monitor should display for each pixel. Similarly, there is enough processing capability to allow a user to create original graphic designs, such as corporate logotypes or unusual charts.

Yet for all its power the 16-bit processor is not powerful enough for certain kinds of mathematical calculations, particularly those that involve running a formula repeatedly against continuously changing numbers. This occurs, for example, in simulating the effects of turbulence on an airfoil or modeling the shape of an underground pool of oil from seismic data. These are immense operations, beyond the scope of a microcomputer unless time is not a critical factor.

A program will calculate the heat produced by the sun as it warms tha inside of a building. Ten times every hour, 24 hours a day for a full year, the temperature at 100 locations in the building is calculated. The computer has to store data representing the size and orientation of the windows, and the normal weather patterns of sunshine for that latitude. The number of computations is literally in the millions. It can be done on an 8-bit microcomputer in slightly more than 30 hours and on a 16-bit microcomputer in about 10 hours. But a minicomputer, such as the DEC PDP-10, which has several 16-bit processor chips working together, can do the calculations in 6 minutes. To an architect who is experimenting with the size of south-facing windows, a day and a half, or even a full working day is too long to wait.

The key words in describing these big, number-crunching requirements are "floating-point arithmetic"—a fancy name for the kind of math most of us learned in school. If you multiply 1.03 by .62, you get 0.6388, but if you are dealing with dollars and cents, you will round off the product to two decimal placas ($0.6386 = 64 cents). Setting a limit of two decimal places is inaccurata, but for dollars and cents it is close enough.

An eight-digit pocket calculator, for exampla, can display only seven digits to the right of the decimal point. That's fine for household use, but scientific calculations usually demand far more accuracy. Larger numbers with more dacimal places must be stored and brought forward every step of the way. The number of possibla decimal places, therefore, must be permitted to float according to need, and that puts a huge demand on the computer for storage space and address capacity. In minicomputers 32-bit bytes (11111111 11111111 11111111 11111111) are the norm.

Until recently 32-bit addressing was possible with only groups of chips, but sev-

aral manufacturers have developed single chips that can address 32-bit bytes. Within a few years, in boxes no bigger than those of current-generation microcomputers, there will be enough computational power to rival the large mainframe computers of today, such as the IBM 370. The most powerful mainframes are popularly referred to as supercomputers. The ones made by Cray or Control Data Corporation have 32-bit architecture enabling them to do three-dimensional modeling of weapons performance and weather forecasting.

Even if that much processing power becomes available in microcomputer packages, ordinary users may not want to pay the price for so powerful a system unless an application demands it.

Video Imaging Demands Power

One potential application that may hava great appeal is the storage and manipulation of video images. Hundreds of thousands of pixels are in a television picture. Many TV stations currently use a multichip, 16-bit computer and a large, hard disk drive to store still pictures from their cameras in the form of digital data. They are used to hold the freeze frame at the end of many videotaped comedies, and they have replaced the use of photographic slides for the stations' announcements, titles, etc. The current generation of these computers permits a director to retrieve two still pictures (frames) per second. With videotape editing a slowly built-up kind of animation is possible.

ATA speed of 30 frames per second animation can be done in "real-time" —as fast as a TV picture is normally refreshed.

When 32-bit microcomputers becoma available, it will be possible to retrieve pictures faster. At a speed of 30 frames per second, animation can be done in "real-time"—as fast as a TV picture is normally refreshed. The 32-bit computer will also have the power to manipulate each image selectively: changing certain colors, or reversing left to right or up and down orientation of not only the entire frame but of any element within the frame.

The key factor in comparing 8-bit, 16-bit, and 32-bit processors is not their inherent power but the cost-effectiveness of using each for the purposes it best serves. Using a 32-bit computer for doing spreadsheets is a little like taking a 10-ton truck to the grocery store.

When people start arguing about bithood as if more were automatically bettar, the knowledgeable person will stay away. You'll get along better if you just smile and say, "that's nice." */PC*

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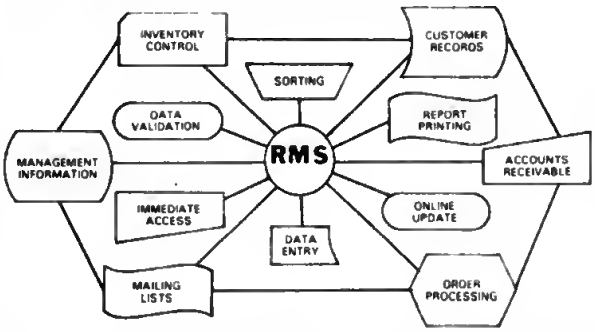

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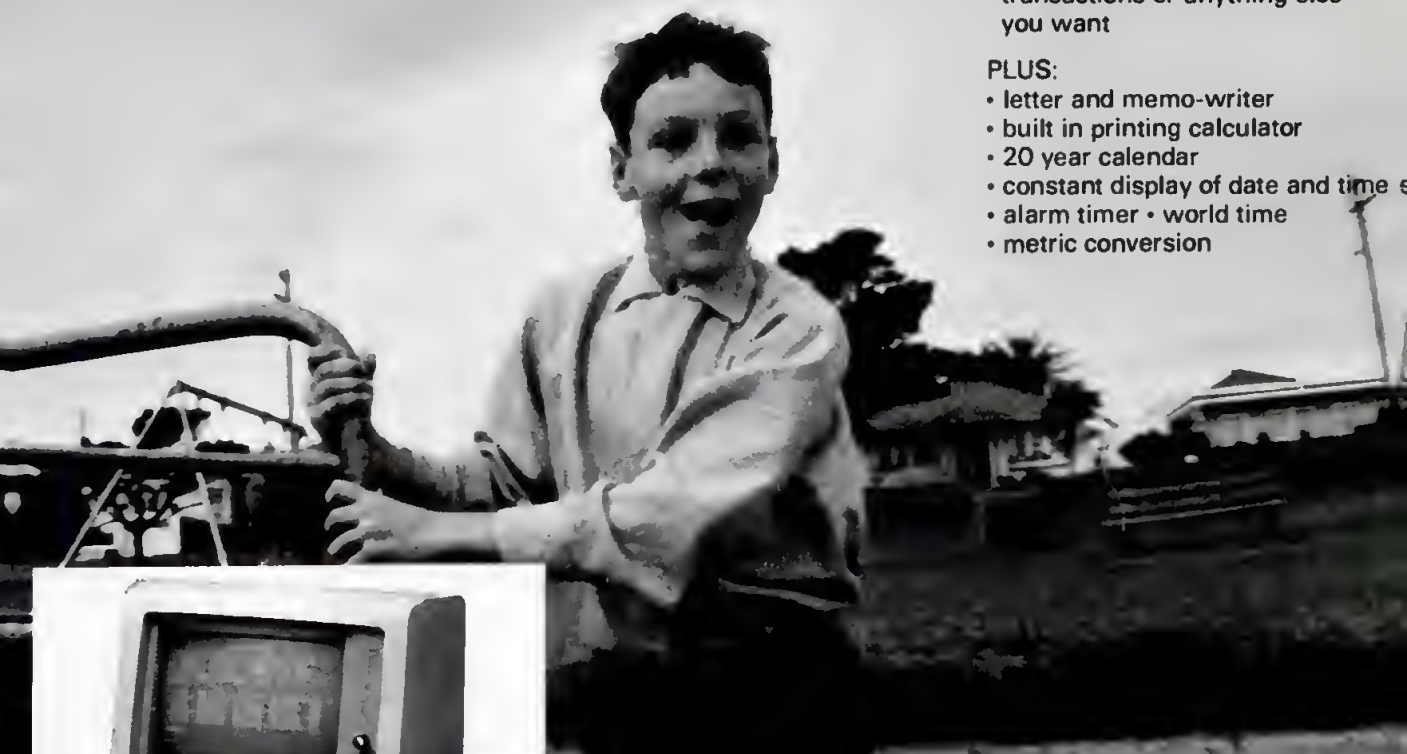

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NEW *QUIKPRO + PLUS* WRITES PROGRAMS FOR YOU IN MINUTES ON *YOUR* Micro

Technical Review
by Wayne Hepburn

QUIKPRO + PLUS is a new breakthrough in software for microcomputers from ICR-FutureSoft.

Until now, whenever you wanted a new separate program in BASIC (Microsoft Basic/MBasic/Basic 80/Oasis Basic), you had to spend a lot of dollars for it, or a lot of hours creating it (if you have the know-how). That's all in the past now.

Anybody who can turn on a computer can write a program, quickly, with this new *Quikpro + Plus* software which generates programs for you. *Quikpro + Plus* is the invention of Joseph Tamargo of Florida. His brilliant approach to program writing allows you to tap the real power and speed of your microcomputer, and it is about time this happened.

I interviewed him to find out more about *Quikpro + Plus* and pass this valuable information to you. He told me "The best part of this software is that it gives you a separate custom program every time you use it. The resulting program is produced, error-free, in BASIC (Microsoft Basic/MBasic/Basic 80/Oasis Basic, as appropriate to your system) for you by *Quikpro + Plus*. What's more, you can list your new program, look at it, see what makes it tick, and modify it as you wish."

You can also, customize, enhance, alter, and even copy the programs you create with *Quikpro + Plus*. This is because programs created by *Quikpro + Plus* are structured, easy to follow, and include many REMARKS statements right in the program listing. I don't know of any other software with the flexibility and ease of use I found in *Quikpro + Plus*.

HUNDREDS OF APPLICATIONS...

For Education, Business, Hobby, Home, Science, Personal, etc. a partial list includes programs like these: Financial Forecasting, Expense Planning, Data Access and Retrieval, Modeling, Record Keeping of all kinds, Statistical Data Banks, and much, much more. *Quikpro + Plus* cuts the time it takes to generate a new custom program down to a few minutes. That's true. I saw a letter from a user who created a separate program in Basic within fifteen minutes after reading the clear, simple, complete Documentation & Operating Manual for *Quikpro + Plus*. The software will generate File Handling and Data Entry Programs in a file format, drawn right on the screen by user. Programs created by *Quikpro + Plus* produce standard ASCII Data Files allowing data to be easily accessed by other programs, other micro's, and even main frames.

HOW IT WORKS...

The operation of *Quikpro + Plus* is simple and easy. On your screen you answer questions which appear in plain English. The answers generate error-free Filing & Data Entry Programs for you...instantly. This completely eliminates the tedious and time consuming development you normally go through to write a program. Since the instructions are right on the screen you don't need any programming skills to operate *Quikpro + Plus*. Quickly, you get a fully independent new program ready to run on your system. After you create the new program you can remove *Quikpro + Plus* and stick it on the shelf until the next time you create a custom program.

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This software is ready to ship immediately and you can start writing programs the day you get in. In fact, ICR-FutureSoft guarantees your satisfaction or you can return it for a full refund in ten days after delivery. How's that for confidence? Mr. Tamargo said "There isn't any risk to us...our product *works* like it's supposed to work and users are very well satisfied. We are glad to guarantee satisfaction."

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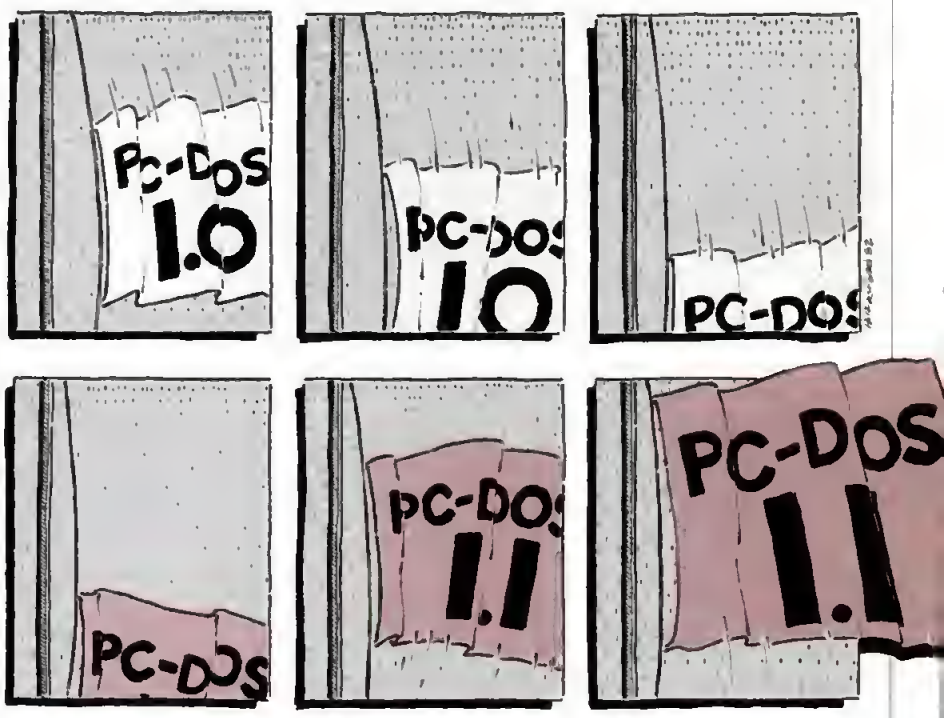

Even as Digital Research announced its multitasking Concurrent CP/M-88 for the IBM Personal Computer, IBM PC-DOS (MS-DOS as it is called by Microsoft) continues to make its mark on the personal computer market, having been announced as the intended operating system by no less than five major microcomputer manufacturers for their new personal computers. This article describes the newest PC-DOS, version 1.10.

On May 17 IBM announced the availability of dual-sided, 320K disk drives for the PC. To support the use of these disk drives, the disk operating system was modified. In addition to the ability to handle the increased disk capacity, the new DOS has many significant improvements.

For people who are considering upgrading from single-sided drives, IBM has made it clear it will not be accepting trade-ins on the old disk drives or on the original version of DOS. The new version of DOS will accompany systems sold after May 17, regardless of whether the single- or dual-sided drives are installed. Single-sided diskettes may be utilized in the dual-sided drives, with the new DOS recognizing them as such (the reverse is not true). Dual-sided diskettes may be utilized in dual-sided disk drives only.

Many changes and improvements have been incorporated into DOS 1.10 that have nothing to do with the use of dual-sided disk drives. The DOS manual has been substantially improved in format and illustrations, and more detailed explanations of certain functions have improved readability. A quick reference card is also supplied.

Differences between DOS versions 1.0 and 1.10 are detailed in the manual and include warnings about compatibility between the two versions. You are warned not to utilize commands such as CHKDSK from one version of DOS while running the other version; data may be lost when mixing the two versions.

DOS and the new Disk and Advanced BASIC versions 1.10 take up more room on the diskette and in memory. Extremely large applications programs may run out of memory with tha new version whera they did not in the old. One example of this is the IBM Asynchronous Communications Support Program running on a 64K system. The program call within the AUTOEXEC.BAT file of DOS must be modified to the following: BASIC TERMINAL/C:0. This command eliminates the area reserved in memory for BASIC's communications buffer and provides additional space in memory to run the program. The communications buffer and I/O functions within the asynchronous communications program are handled by an interface with an assembly language program.

I/O Speed

The speed of the disk I/O has been increased. Although IBM has not published any specific figures, improvement in disk access appears to ba 100 percent. Using tha format command as a baseline, DOS version 1.0 formatted a single-sided diskette in 34 seconds, while DOS 1.10 formatted a single-sidad diskette in 19 seconds, including the time necessary to provide improved specification printout upon completion of the format process. SPEEDUP.COM, a patch to DOS 1.0 that performed the same function, is no longer needed in DOS 1.10, and any attempt to use it in the new DOS will result in program errors or unpredictable results. An improved specification status report used in the new format function details the number of total bytes on the diskette, the number of bytes used by the system, and the number of bytes, if any, in bad sectors. The new format command also provides for the ability to format diskettes as either

single- or dual-sided.

Time and Date

Immediately noticeable after listing a directory of the new DOS diskette is that the TIME.COM and DATE.COM programs are missing. These functions have not been eliminated but have been included within the COMMAND.COM program and now reside as "internal" functions. This has increased the size of the resident portion of COMMAND.COM as it exists in memory and on the diskette.

The date function has been changed somewhat in version 1.10. Using the original DOS, if no AUTOEXEC.BAT file was present on the diskette, the user was required to enter the date prior to proceeding with other DOS functions. The date function called from the command level of DOS was displayed in a different format and could be bypassed by depressing ENTER. DOS 1.10 has only one type of date function, and the date entry is always optional, even if an AUTOEXEC.BAT file is not present on the diskette. The date function, initialized on 1-1-1980, automatically calculates the day of the week (initially displayed as Tuesday), but it may not be entered manually.

The value of the calculated day of the week function seems questionable, since it is not automatically displayed after the correct date has been entered and is displayed correctly only if the date function is called a second time. The calculated day of the week is not accessible as a separate DOS function, nor is it accessible from BASIC. Time and date may be entered by following the TIME or DATE command with the correct data. You need not call the Time or Date functions prior to entering the data unless you prefer to have the current time or date displayed.

Printout

One of the most common complaints about DOS 1.0 was that when the diskette file directory contained more than 25 entries, the directory scrolled off the screen at the speed of light when using the DIR command. This problem has been corrected in DOS 1.10. The DIR command now has two format options. "/W" appended to the normal DIR entry will cause the diskette directory with file names only to be displayed on the full width of the screen. This type of directory is similar to the directory produced when using the FILES command in BASIC; however, the files are spaced farther apart horizontally for easier reading.

"/P" appended to the DIR entry will cause the file directory to be displayed vertically on the screen, pausing after the screen is full and prompting the user to depress any key to display the rest of the directory.

An Easy Way to Transfer DOS 1.10 to DOS Diskettes

The following allows you to create a batch file for easy transfer of DOS 1.10 to existing applications program diskettes.

Create a batch file on a DOS 1.10 diskette by inserting the DOS diskette in drive A and entering the following:

```
COPY CON:TRANSFER.BAT <enter>
SYS B: <enter>
COPY COMMAND.COM B: <enter>
ERASE B:DATE.COM <enter>
ERASE B:TIME.COM <enter>
^Z <enter>
```

Depress function key 6 and ENTER. A "^Z" will appear on the screen, and the batch file will be recorded on the diskette. Now insert your applications programs in drive B. At the DOS prompt "A>" type in TRANSFER. If you also want to transfer BASIC and BASICA, enter TRANSFER COPY BASIC?.COM B:. If you want to transfer all DOS.COM files, type TRANSFER COPY *.COM B:. If TIME.COM and/or DATE.COM do not exist on the target diskette, an error message will appear, indicating the file was not found. Disregard this error message; it will not affect the final outcome of the transfer. Erase these files from the DOS 1.10 system since they now reside within the COMMAND.COM file.

This batch file may not meet all your unique system requirements. Check your target diskette for any other DOS programs or utilities you may require, and if you are using SPEEDUP.COM on your old DOS version, be sure to erase it and remove the call from the AUTOEXEC.BAT file.

THE DIRECTORY scrolled off the screen at the speed of light.

The full directory includes the new feature of time, as well as the usual date displayed next to the file name, and the number of bytes used by the file. The total number of files on the diskette is now displayed at the end of the directory listing. New defaults have been provided when designating file names under the DIR command. File names used with the DIR command limit the directory output to a subset of the total file directory. For example, if DIR FILEA is used, the file name extension provided by the program is the same as ".*", a global file-name extension. If no extension was desired for FILEA, a period would follow the file name DIR extension. In this example, all DOS command files with an extension of .COM would be listed on the screen.

Commands

One of the most heavily modified and most poorly documented of the DOS commands in version 1.10 is the COPY command. The COPY command now allows the user the option of combining a file with two or more other files. This capability, "file concatenation," will allow the combination of multiple files into a new file containing all designated files or the addition of multiple files to an original file.

Files are designated for concatenation by placing plus (+) signs between the files to be concatenated. Special use of the concatenation function will also allow the user to update the time and date recorded for a particular file or control whether the date and time recorded during a copy operation are current or the original date and time recorded for the file.

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COPY commend is the /A (ASCII) or the /B (Binary) copy option. The /A option, when used with the source file name, causes the file to be hendled es e text file. All data within the file is copied until en end-of-file marker is encountered. The /B option allows the entire file, as determined by the directory size, to be copied to the terget file. The /A option used with the target file allows an end-of-file code (decimal 26 or ^Z) to be the last character of tha file. The /B option prevents en end-of-file coda from being pleced in the file.

DISKCOMP allows the user to designate a comparison of the entire diskette or just the first side.

Another option now available in the COPY commend is the /V (verify) option. When this option is invoked, the sectors recorded on the terget diskette are verified. This would be similer to using the COMP commend efter the copy operetion has been completed; however, in this cese, the verification is accomplished during the copy operation, end no indicetion of successful verificetion is provided. Only sectors reported incorrect cause an error message if the verify option hes been invoked. Verification slows down the copy operation, since it is performed along with the copy operation. Files being copied are now displayed on the screen as they are copied. This is extremely useful when globel file nemes heve been used in the COPY commend, since not only the number of files copied is reported, but elso which files have been copied.

The DOS 1.10 CHKDSK command now reports additional informetion: totel bytes of disk space (helpful in determining if the diskette wes formatted as a single- or duel-sided diskette); the number of bytes in hidden files, user files, and bad sectors; and the remaining bytes available on the diskette. The total amount of memory and the number of bytes free are reported as they were in DOS 1.0.

File verificetion is eccomplished with the COMP command. DOS 1.10 provides more informetion ebout diskettes that do not compere fevorably. When e comparison error occurs, the reletive locetion of the compare error is reported as well as the ectuel bytes that do not compare. While individual file verificetion is eccomplished through the COMP commend, complete diskette comparisons ere eccomplished through the DISKCOMP command. DOS 1.10 DISKCOMP allows the user to designate e comparison of the entire diskette or just the first side. Diskettes that do not compare identically will generate en error message that will contein not only the first track in error, but also the side the treck is on. Dual- or single-side comparisons are determined eutometicelly if the single side option is not used, based on the type of diskette first reed by the progrem. The DISKCOPY command has elso been modified to ellow selection of single- or duel-sided copying.

The ERASE commend hes been modified in DOS 1.10 to eccept the ebbrevietion DEL as well as ERASE. When global fila nemes ere used to designate the complete erasure of e diskette, the user is requested to verify intentions to prevent accidental erasure.

Another heevily modified commend in DOS 1.10 is the MODE command. The MODE commend has the additional feeture of being able to set options for the communicetions edepter as well as essigning line printer output from the perellel port to the seriel port. DOS 1.0 did not reedily support connection of seriel printers to the asynchronous communications edepter. The DOS 1.10 MODE command utilized with the communications edepter will allow user definition of peremeters such es beud rete, perity, numbar of data bits, and number of stop bits. A "P" must be appended to the peremeter string to allow for the elimination of time-out error checking for use with seriel printers.

This command must be invoked prior to redirecting the parallel printer output to the serial port. That leads to the next option, the assignment of LPT1, 2, or 3 to the asynchronous communicetions edepter 1 or 2. For example, MODE LPT1:=COM1 assigns the output for parallel printer port #1 to serial port #1. Reassignment of vertical or horizontel line definitions using the MODE LPT1:80,6 for example, will cencel the reassignment of the ports as discussed above. It is important that the user invoke the options of the MODE command in tha correct order to prevent one commend from cenceling out the other.

A completely new DOS command is evailable in version 1.10. It will most likely be of interest to those who program using compilers eveileble for the PC. The command is EXE2BIN.COM. The purpose of this commend is to allow a compiled progrem to be reformatted in such a way that it uses less space on the diskette and can be loaded by the DOS command processor. Successfully converted programs must be renemed with the extension .COM for processing. Progrems in commend formet will generally load faster.

EDLIN, LINK, end DEBUG elso reside on the DOS diskette. Although no noticeeble changes have been mede to the EDLIN progrem, LINK end DEBUG have both been improved in version 1.10. The greatest improvement to the LINK program is the supporting documentetion, which has been rewritten end is fer mora complete than the originel version. LINK now supports all IBM progremming lenguage compilers. DEBUG has been modified to eccept loed files longer then 64K and includes an option to compare two blocks of memory.

BASIC

Disk BASIC and Advanced BASIC versions 1.10 have been enhanced end contain ell the corrections supplied in the BASIC update version 1.05. The DOS 1.10 menual has pages thet differ from the BASIC 1.0 menuel to provide the necessary documentation for the new feetures. However, for systems shipped from the fectory efter the ennouncement of DOS 1.10, the new BASIC menual 1.10 is included, and the eltered pages provided in the DOS menuel need not be entered. Improvements to BASIC include being eble to helt

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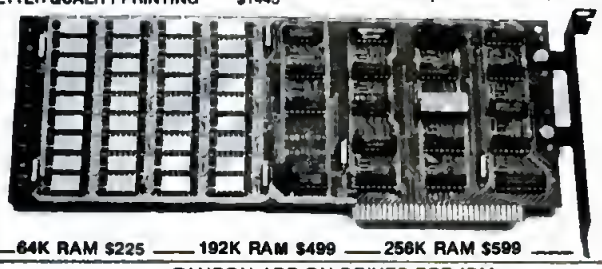

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a program listing to LPT1: through:

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- A new VARPTR$ function to allow for retrieval of variable locations in memory for later use in compiling programs that make use of string variables for the DRAW and PLAY statements.

PC-DOS continues to make its mark on the personal computer market.

Problems

Up to this point I have mentioned only some of the differences and improvements made to DOS 1.10. While researching the product, I discovered several potential problem areas for PC users. First, the new COPY command does not work as described in the manual. While utilizing the binary copy option, or /B, which should allow you to copy a complete file based on its directory size, I discovered that the command works if your destination file is a diskette file and not a device such as the printer, LPT1:. In this case the file was copied only to the first end-of-file code encountered, instead of in its entirety, as was indicated by the directory size.

The second problem I encountered was utilizing the COPY command's file concatention option. Files are optionally designated either binary or ASCII. If no designation is entered, ASCII files are assumed. If the user makes a mistake and designates a file incorrectly, he may render the program or (when using global file names) the entire diskette unusable. This is another good case for backing up your

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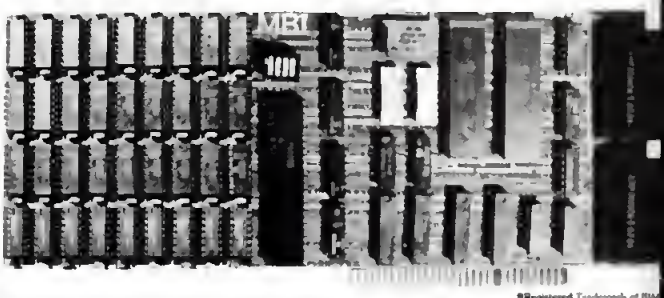

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files, especially before using the concatenation option of the COPY command.

Finally, in BASIC 1.10 as well as in BASIC 1.05, I was unable to input date and time from a Hayes chronograph connected to the COM2: port. I had had no problems with the same hardware configuration utilizing the earlier versions of BASIC. I later discovered that a modification was required to my dual port communications board. IBM had apparently made some changes in the interrupts for "COM2:" from the original technical specifications. Luckily, the company that made my board, AST Research, had the foresight to provide for this eventuality. I installed the appropriate jumper wire to the board and corrected the problem.

CONSIDERING the purchase price, it is a reasonable upgrade for DOS 1.0 owners, even if they aren't interested in upgrading their systems to 320K disk drives.

I wasn't the only one to have some problems implementing DOS 1.10. Owners of the IBM version of *WordStor* were disappointed to learn that their program would not run on the new DOS. MicroPro is working on an update to *WordStor* to correct the problem (it may be available by the time you read this article). Several other PC owners who have upgraded to dual-sided drives are unhappy that they are unable to transfer backups of copy-protected programs to dual-sided diskettes.

The new DOS can otherwise be transferred to an existing program diskette through use of a combination of the SYS command and the COPY command. A sample batch file for transferring the new DOS 1.10 to existing diskettes is provided on page 112.

One of the biggest problems with the new DOS and BASIC is the manner in

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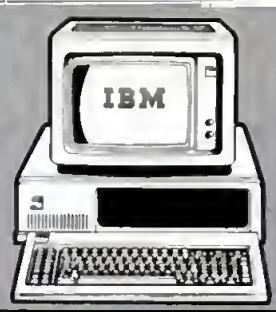

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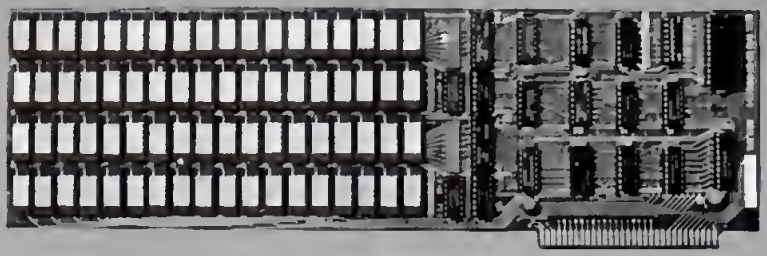

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which IBM hes chosen to provide updetes for owners of the previous versions of DOS and BASIC.

The naw BASIC manuel has been substantially rewritten. A completely revised Appandix C describes procedures used to properly intarfece assembly language progrems with BASIC. The original BASIC manual contains incorrect informetion. No correction or updata is being provided by IBM for Appandix C. The new BASIC manual makes refarence to the BASIC compiler under eech instruction, indicating whether tha instruction is valid for the compiler end, in cartein cases, which functions or statements have different useges in the compilar. Again, no update has been provided for owners of the original BASIC manual.

Appendix F now contains detailed information about the asynchronous communications edapter. Appendixes H, I, and J can be found in the new manual but not in the old. Appendix H is e hexadecimal conversion teble. Appendix I includes important informetion, such as what to expect from the VARPTR$ function, how to change from the color display to the monochrome displey when both ara connected, special techniques used to improve progrem performanca, and other technical information including BASIC's memory maps. Appendix J is e Glossary of dafinitions that would be extremaly helpful for the novica programmar.

Users of the IBM VisiCalc program racently experienced e class act whan VisiCorp provided registered owners with updates to its originel release of tha program. VisiCorp is to be applauded for its technique in handling progrem updates. Most IBM PC owners I have talked with express tha desira to heva complata up-to-date information, even if it is provided in the form of a ranewable yearly subscription. Most ara disappointed that IBM has chosen to leava PC owners in the dark, or in the position of having to beg for information about program fixes, improvemants, end corrections. Perhaps IBM can take a lesson from VisiCorp end provide timely updates and information in the future.

Many significant improvements have been made in DOS 1.10. Considaring the purchese price, it is e reesoneble upgrade for DOS 1.0 owners, even if they aren't interested in upgrading their systams to 320K disk drives. */PC*

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Diana Herron, field ornithologist and data base builder.

Diana Herron divides her time between the choice bird-watching areas of San Diego and her computer room with a view. Although her specialty is observing and gathering data about birds, when she's at the desk with her PC, she has a 180-degree view of the ocean complete with frolicking gray whales during a few weeks in winter. In short, she may have more alluring reasons than most of us to spend time at the keyboard and screen.

Herron points out, however, that the PC she and her husband Bill bought last October is still relatively new to her. The focus of her vocation is outdoors—working with the San Diego Natural History Museum, leading bird walks for museum members, and participating in bird counts and other activities of the San Diego Field Ornithologists. What she has discovered recently is that she can readily utilize the computer's powers in much of her nature-oriented work.

"My interest is ornithology," she notes. "I have a couple of notebooks full of raw data on birds. On May 15, for example, we went to a state park in the mountains, and I wrote down some data: where we were, the weather conditions, the time, and all the birds we saw. I may also make notes on mammals, and sometimes I make notes on behavior. On this day I saw an interesting nesting behavior. So I often have more than just a listing of birds."

Diana has been building this collection of information on bird and animal sightings, behavior, and habitats for 10 years. Within the last few months, she has begun putting it into the computer and constructing an overall format for the information.

"I can see a lot of ways to manipulate this kind of data. It's going to take a long time to put 10 years of data into the computer. There's a certain order for the list of bird species, and there are other ways I'll want to use the information." As yet Herron has not purchased a commercial data base program. She presently relies on a data entry program her husband wrote and uses *VisiCalc* to display and rearrange some of the data.

"For my birthday my husband gave me a program—sort of a prototype of what I'll need for the antire data base," she explains. "A friend took me birding—it's a tradition that we take each other birding on our birthdays—and when we came back home, Bill had this program waiting for me, so we put in the information. He had it arranged so I could put in the name of bird, data, and some remarks. If I can do that each time I come home with a list of 30, 50, or 60 species, once I have the format, it won't take long to sit down and put the information into the computer. It would be as quick as writing it down on a piece of paper."

Surprisingly, Diana does not make notes while she's observing birds and animals in the field, so she wouldn't benefit much from a portable computer (the PC 3?). "I usually make the list of what I've seen when I come back, off the top of my head. It's not that hard, really, when you're used to it. I'll take a checklist of the birds of the area, such as San Diego County, and go through it and ask myself if I saw the particular birds on that list. Many of the birds are common ones you see all the time anyway, so it's no trouble to remember them. And when it's a new bird," she adds, "you remember it."

She does take a bird identification book with her in the field, and it is likely to be smaller and lighter than a portable computer for some time to come. "With some birds the first time I see them I know what they are; they're so distinctive, and I've seen them in the books and been on the lookout for them. Some of the others—in a group, like sparrows or warblers, with quite a few that are similar—I have to look up. And I also have to look up birds I have seen, especially young ones, birds in fall plumage, or birds I've seen only a few times and don't remember."

One of her current projects, for which the PC will be instrumental, is gathering and analysing information for a guidebook to the birds of Balboa Park. This is a 1,150-acre natural area close to downtown San Diego and the site of the city's famous zoo, as well as the Natural History Museum, and several other cultural and scientific institutions. It's also a great area for birding, Diana reports.

"For the past year I've organized a census of the birds of the park for the guide we want to publish. This book would be very

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useful, because people come here from other areas of the country; they'd like to do some birding, and they often end up in Balboa Park because of the zoo and the other museums. So we can make a map and mark trails in the good birding areas."

To be certain that the guidebook will have complete and accurate information, Herron has assembled a group that spends a morning each month counting the birds and recording their nesting behavior in key areas of the park. "This will mean that when I get ready to do the guide after November, I'll have a better picture of the birds in the park. I'll plug all that information into *VisiCalc*, and I'll be able to put in the whole list of birds and keep track by month. This is particularly important for some of the less common birds, because we're not sure whether they're here all year. I've done some of this kind of work on paper, but in the computer it will be faster and more complete."

Another way the PC will assist Herron's bird studies is in adding to her standardized lists and compiling her life list. As she points out: "One of the useful things about the computer is that if I have a list and then have to insert something, I can put it in where it belongs; I can't do that on paper without lots of trouble. There is a standard order that all the checklists are printed in, and I like to keep to it; that order makes a difference."

Bird lists are grouped by species, but in a certain biological sequence. "The standard listings are by stages of development of the birds," Diana states. "Ducks are at the beginning because they're among tha more primitive—they are closer to the early forms of birds. As you go through, the birds farther down the list are more advanced and have newar adaptations. It's a kind of biological order basad on some evolutionary theory. The sparrows and finches are at the end of the list; they are later comers in the bird world, and they are highly adapted."

Just as the flexibility of inserting a new species in the correct biological sequence is important to such bird listings, so is the ability to move data around for comparison and census-taking. Herron can now set up a *VisiCalc* chart that will show the percentage of growth or change in various bird populations, perhaps displaying the same month of 2 different years in adjacent columns for quick reference and even predicting future populations based on the trends of past growth or diminution of certain birds' numbers in a specific area.

When she finishes entering her 10 years of bird observations and related information into this specialized data base, she will be able to locate specific sightings of rare birds or pinpoint locations of nests within a few moments—a job that would take hours without the computer, and ona that she seldom has attempted because of the thousands of citations to be chacked. This is the kind of information that would help other researchers, as well, she points out: "Some people seem to keep a lot of this information in their heads pretty well, but they can't keep it all."

IT'S GOING to take a long time to put 10 years of data into the computer.

Diana Herron views her PC as a useful tool that can assist her in the work she enjoys most. She sees the computer as part of a natural evolution in technology. "I sea myself as a scientist, a biologist, or a person who is involved in the community through my work with the museum. Tha computer is a tool for me to use in thosa endeavors. We've always had a typewriter, and I think you might look at the computer as another jump. Just as the calculator is a jump from pencil and paper, the computar is a jump from the calculator. The computer is a step up from both the typewriter and the calculator, putting tham togethar and doing all kinds of creative things."

Obviously Diana Herron has set her sights high—usually in the trees and in the sky—for the PC that overlooks the Pacific. "My husband worked with computers some years ago. When he began talking about getting a computer and what computers can do, I started thinking about how one might apply to my birds. I now see them as pretty marvelous machines that can do an awful lot for the human. It's a new way of looking at the world, or in my case, my birds." */PC*

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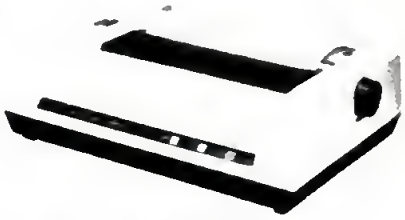

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Communications Briefs

Telenet Rate Shift Boosts EIES Costs

GTE Telenet, one of the three public packet-switched networks, has shuffled its price structure in a way that makes user costs a function of geography for the first time. Previously, Telenet charges were uniform once you had accessed a network port. Under the new schedule, rates differ according to area density.

Many information services, such as the Electronic Exchange Service (EIES), operate via Telenet and the other public packet nets, Tymnet and Uninet. These networks keep costs down by efficient data routing.

Telenet says it is providing a means for customers to control their costs; but to the EIES network the change looks like another price increase. Telenet-connect charges on EIES have gone from $3.75 to $9.50 per hour in less than 18 months.

Telenet's new rate structure cuts prices in 27 cities recognized as high-density areas and raises them in the other 225 cities where it operates. Per packet charges have also been raised. No longer are prices uniform throughout the network. "Savings are available through volume discounts of 10 to 30 percent," according to a Telenet announcement.

"It is a beautiful example of creative writing on the part of Telenet," replies EIES director Murray Turoff. The usage base for the discount rate has been raised, he says, and host tie-in charges have been raised; the net effect is a rate boost. It amounts to only 5 cents an hour in the high-density cities, but $3 an hour in the rest, Turoff says. In addition, the educational discount (which EIES receives as a member of EDUNET) has been cut from 15 percent to 7 percent.

Worst of all, Turoff says, the Telenet-supplied hardware interface between EIES and the network does not provide EIES with a caller's location. Packet network calls are made collect, but EIES has no way of knowing at what rate a given caller will be billed.

Uninet No Answer

News of the Telenet rate change made EIES members thankful, at first, that they had just installed an interface with Uninet, the rival packet network owned by the nation's third largest telephone company, United Telecommunications Corp. (Telenet is owned by General Telephone & Electronics.) At only $7 an hour, Uninet looked like a good way to avoid the higher Telenet rates.

Within weeks, though, EIES users were complaining that Uninet was unreliable as an access medium and so slow in response time that Telenet was cheaper even at a higher rate. Part of the problem was apparently due to difficulties with Uninet's 56khx intercity trunks.

Standard Message Format

Six companies that market electronic mail systems have announced agreement on the general message format developed by the National Bureau of Standards. The standard simply sets the form of a message; it says nothing about how it is to be sent or displayed. Three types of fields are recognized: three required fields (To, From, Date Posted); plus standard fields that must be accepted by all computer-based message systems, but need not be present in every message; and optional fields, which may be ignored by the receiving system.

The six companies are BBN Informatinn Management (Infomail); Computer Corp. of America (Comet); Dialcom; Digital Equipment Corp. (DECmail); GTE Telenet (Telemail); and TYMNET, Inc. (On-Tyme II).

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EDITED BY ANDREW FLUEGELMAN

User-To-User

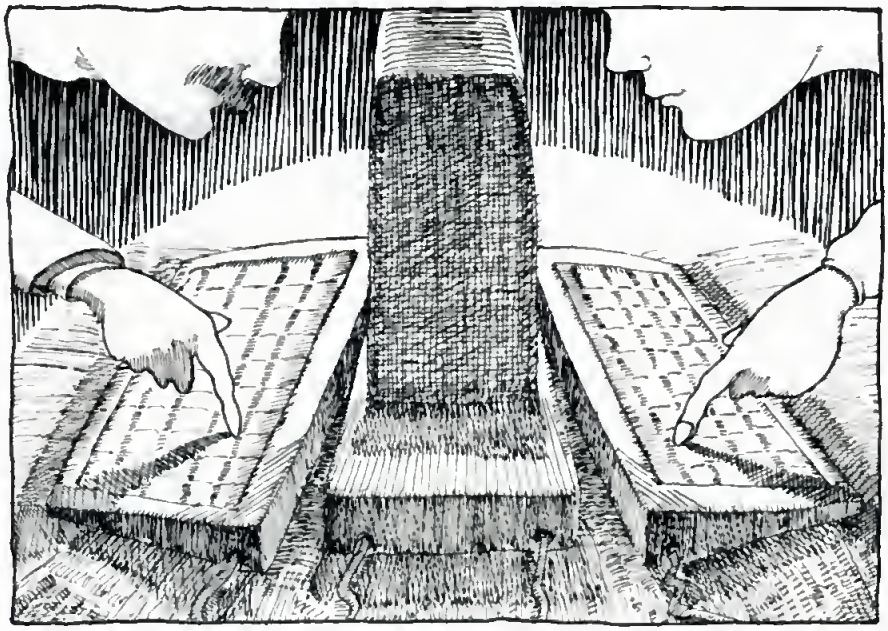
PC readers pass on programming tips, describe their discoveries, and exterminate bugs.

An Invitation to Share . . .

This regulor User-To-User deportment will pass olong field-tested innovotions, tips, caveots, ond questions concerning IBM Personol Computers, contributed by PC reoders. Alreody there has been o wellspring of insights, o few gripes, ond some unonswered questions flooding our moilbox. We have inouguroted this department as o ploce to shore them.

Before sampling this month's offerings, o word might be in order regording the "philosophy" of this department. We recognize thot computer users, like outomobile owners, have different involvements with their mochines. Some ore content knowing how to chonge o tire or leorning how to drive in snow. Others might wont to ploy with odjusting the corburetor. A few might even get down to the grimy business of rebuilding the differential. (At leost with computers you don't need o set of Allen wrenches, ond you con forget the Boroxo.)

We'll try to serve all interests in this space, but we will avoid purely theoreticol discourse. We simply wont to pass olong whotever mokes the little beost work better. If the going gets seemingly technical, don't be put off—better yet, stick with us. Anyone con (ond should) leorn to chonge o tire.



The BASIC Shell Game

Last issue's column detailed reported bugs in IBM PC BASIC version D1.00. The morning we were sending final copy to the printer IBM released version D1.05, purporting to correct them. The best we were able to do was hastily insert a box with the news.

The new version has fixed all the bugs we mentioned plus a few more readers have reported. IBM's list of corrections is reprinted here:

BASIC and BASICA V1.05 Solutions to Reported Problems in V1.00

1. In isolated situations a decimal point was misplaced by one position during output—not during calculations. The decimal point was misplaced by one position if all four of the following conditions applied:

a. The program was written in BASIC; and

b. Numbers in double-precision were involved; and

c. The numbers involved were less than 1, and were close to, and very slightly smaller than, a power of 10 (e.g., 0.09999999999999995); and

d. The number was converted from internal machine notation to an external, readable form, but the user did not or could not specify a format in which to represent the answer.

To show how isolated the situation was, less than 200 out of approximately 18.5 million-trillion double-precision numbers were displayed inaccurately. No IBM Application Programs were affected by this situation.

2. CHR$(7) can now be sent to a file or any device and will "beep" the "bell" correctly.

3. DATE$ and TIME$ can now be followed by a blank before the comment or multiple statements separator.

4. The LOC function, when used with a random file, has been fixed. BASIC V1.00 returned the physical record with LOC. BASIC V1.05 returns the logical record with LOC.

5. Variable initialization problems are now fixed. In BASIC V1.00 variables sometimes did not compare = 0 unless explicitly assigned.

6. Copyright notice and soft keys will not be displayed in BASIC V1.05 if the BASIC command line is used to load and execute a BASIC program. (enhancement)

7. The DRAW statement now clips lines at the edges of the screen rather than wrapping them around to the other side of the screen.

8. Graphics PUT of objects less than 8 bits wide has been fixed to work correctly with the PSET and PRESET action parameters.

9. BASIC V1.05 allows the PLAY and DRAW statements to use "execute string" commands within "execute string" commands. In other words, the executed string may contain "execute string" commands.

10. BASIC V1.05 resets PEN/STRIG to OFF and PLAY/SOUND to "MF" when RUN/CLEAR commands are executed.

11. CIRCLE (x,y), r, start, -end now draws a line from the correct endpoint to the cen-

ter of the circle.

12. The INKEY$ function has been corrected so that it does not hang after the last character of a "soft key". The documented circumvention in the *BASIC Reference Monuol* (POKE 106,0) is not necessary in V1.05 though it will not affect existing code.

13. The WRITE $ statement now pads to the end of record with blanks.

14. BASIC V1.05 now supports the "ignore out of paper" mode on the IBM 80 CPS Matrix Printer. This mode is selected by executing the following statement:

```
LPRINT CHR$(27);"8";
```

See the *IBM Personol Computer Technicol Reference Monuol* for more details on how the printer handles this command.

15. The SYSTEM command will now restore the correct information for the video display that was active when BASIC was loaded. This is important only for systems with both the Monochrome Display and Printer Adapter and the Color/Graphics Monitor Adapter on them.

16. The TAB function now works correctly in all cases in the LPRINT statement. In BASIC V1.00 it did not work correctly after executing a WIDTH "LPT1:",255 statement.

17. OPEN "LPT1:" FOR OUTPUT AS #1 followed by PRINT#1,CHR$(10) now works correctly.

18. The POINT function no longer changes the "last point referenced." Only graphics statements can change the "last point referenced." (See page 3-39 of *BASIC Reference Monuol.*)

Anyone who has a copy of BASIC D1.00 can get a free update by bringing his or her DOS 1.00 disk to an IBM dealer. (There doesn't seem to be any way to correct the cassette version of BASIC on the machine's ROM chip.) IBM has also released DOS version 1.10. This new DOS contains the same corrected version of BASIC except that it is identified as "BASIC version D1.10." The new DOS costs $40. Newly manufactured PCs are being supplied with a revised BASIC manual with corrected and additional material. IBM will not provide current PC owners with replacement BASIC manual pages, but the new, expanded manual can be purchased for $36 from PC dealers.

Programming in BASIC

A reader who prefers to preserve his anonymity passed along the reminder that you may not have multiple NEXT statements with a single FOR as you can in some BASICs. This is usually not a good programming practice, but it is important to know when converting programs from another machine. The following program produces the error "NEXT without a FOR in 30".

```
10 FOR I = 1 TO 4
20 IF I = 1 THEN NEXT I
30 NEXT I
```

The way to code this correctly is to change line 20 to read "20 IF I = 1 THEN 30".

Dr. Willard A. Brown, who provide the serial printer patch in last issue's co umn, suggests an inventive programmin technique: "I am certainly not know among my colleagues as a fanatic on th subject of program structure, and I don mind using a GOTO occasionally where makes it easier to understand prograr flow. However, the lack of a block struc ture such as

```
IF (truth statement) THEN 00
  statement(s)
  statement(s)
  ----
  ----
  END
```

was more than I wanted to endure in P BASIC. Unfortunately, the WHILE WEND block doesn't do the job, sinc such groups are executed at least onca.

"The following does get around thi problem in a reasonably clear fashio Use of the word "DO" as the variabl name makes the syntax self-documentin to some extent.

```
FOR 00 = (truth statement) TO -1 eg. FOR D
= (X=Y-1) TO -1
  statement(s)
  statement(s)
  ----
  ----
  NEXT 00
```

NOTE 1: For nested blocks of statement be sure to use DO1,DO2,DO3, etc., t eliminate ambiguity.

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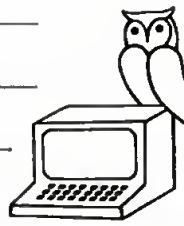

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NOTE 2: Truth statements are of the form: X=Y or perhaps LINE1$<>LINE2$.

"If the truth statement evaluates to true, it has a numerical value of -1, and the group of statements is run through once. If the truth statement evaluates to false, it has a numerical value of 0 (zero), and the group is not executed."

Dr. Willard A. Brown
Bellingham, Washington

More BASIC Tips

Have you ever made an unfortunate choice of a variable name in a long BASIC program and wished you could change every occurrence of that name to something else with a single command? With IBM's DOS line editor, EDLIN, you can.

First, save your program in ASCII format with a BASIC SAVE "MYPROG",A. Return to DOS with a SYSTEM command. Then enter EDLIN MYPROG.BAS. Type 1 LIST to list the first few lines. Then follow the syntax given for the REPLACE command.

To change all occurrences of "VARIABLE1" to "VARIABLE2," for example, you would use the following sequence: 1 VARIABLE1 (press function key 6) VARIABLE2, and then press ENTER. After the changes, be sure to enter END and press ENTER to save the program. Go back to BASIC and load the ASCII version directly (it's slower loading so be patient). Then you can do a normal SAVE.

Make an extra copy of your program until you get the hang of EDLIN; it makes changes with such blistering speed you can't get to a break key before a typing error will scramble your entire program.

James Cowden
Austin, Texas

The one-line subroutines below may help those frustrated with the toggle status of the CapsLock key. With these routines it is possible to force the keyboard into upper- or lowercase mode from within a BASIC program.

Calls to these subroutines before an input statement make anticipating both upper- and lowercase responses unnecessary. The last poke of each routine places either ↑ or ↓ in the last character of line 25 on the monochrome display to indicate upper- or lowercase (not required). NumLock, ScrollLock, etc. are toggled by other bits in the same byte (&H17).

```
Set lowercase: GOSUB 10.
10 DEF SEG=&H40: POKE &H17, (PEEK(&H17) and &HFFBF): DEF SEG=&HB000: POKE 3998,25: RETURN.
Set uppercase: GOSUB 20.
20 DEF SEG = &H40: POKE &H17, (PEEK(&H17) and &HFFBF) +64: DEF SEG = &HB000: POKE 3998,24: RETURN.
```

John Marler
Rochester, Minnesota

HAVE YOU ever made an unfortunate choice of a variable name in a long BASIC program?

Color Switch

The following programs switch between color/graphics and monochrome display if both adapters are present in the system. The programs were listed from dealer demo disks supplied by IBM.

```
10 'SWITCH TO 40 COLUMN COLOR PROGRAM
100 KEY OFF: CLS
200 WIDTH 80: DEF SEG=0: A=PEEK(&H410): POKE &H410, (A AND &HCF) OR &H20
210 WIDTH 40 :SCREEN 1: SCREEN 0: LOCATE ,,1,6,7
215 KEY ON

10 ' SWITCH TO MONOCHROME DISPLAY PROGRAM
100 KEY OFF: CLS
200 WIDTH 40: DEF SEG=0: A=PEEK(&H410): POKE &H410,A OR &H30
210 WIDTH 80: LOCATE ,,1,12,13
215 KEY ON
```

David Lee
New Hope, Minnesota

Eine Kleine Pascal

The IBM Personal Computer Pascal language is very powerful and flexible, but it lacks many of the built-in functions of BASIC, which help you get the most out of your machine. One of the most important of these functions, LOCATE, lets you put

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the cursor anywhere on the screen. The LOCATE function is essential for full-screen applications.

Following is a simple and efficient way to locate the cursor anywhere on the screen:

module loc;

```
(* Procedure to locate the cursor on the screen of
the IBM PC Monochrome Display at (lx,ly). It
places the cursor one position to the right of
where it should be and then moves it by writing a
backspace.
Top left is (1,1). Bottom right is (80,25).
Written by Jonathan Seder, March 1982.*)
procedure locate(const lx,ly:integer);
    type cursor_data, record posx,posy: char;
    end;
    var cursor_[static]: ads of cursor_data;
    value cursor.s := 16*40; cursor.r = 16*50;
    begin
        cursor ^ .posx := chr(lx);
        cursor ^ .posy := chr(ly-1);
        write(chr(8));
        end;
    end.
```

Jonathan Seder
Palo Alto, California

"I use Pascal extensively at school (I am a senior at the University of Virginia), so as soon as I had 128K of memory, I began using IBM Pascal. Things went pretty smoothly at first, as I made only simple tests of the compiler. Eventually, I started large-scale software development efforts in Pascal. As I expected, my source code had many syntax errors in it the first few times I attempted to compile it. After three or four attempts at compiling my source code, using the same scratch disk, I got a disk full error.

"On examining the disk with the DOS CHKDSK program, I discovered that some 130K of disk space was marked used in the disk allocation map but was not associated with any file directory entry. Nicely, CHKDSK freed this space for me. Further experimentation showed that PAS1 of the Pascal compiler does not clean up after itself if it encounters any syntax errors during compilation. Since the two passes of the Pascal compiler are separate programs, information is passed between them through the use of disk files on the scratch disk.

"PAS1 creates the files and PAS2 is responsible for using and erasing them. PAS1 creates file directory entries for these files with a file size of zero. It then allocates and uses necessary disk space for these files, but it does not associate this disk space with the file directory entries for these files until the very end of PAS1. If any errors are encountered in PAS1, this association step apparently never takes place. PAS1 does erase the two files if errors occur, but since the files were never associated with actual disk space, this space remains allocated. At 20K to 50K per attempt, this phantom disk space quickly accumulates to the point at which the disk appears full.

"I understand that IBM and Microsoft are aware of this problem and plan to correct it, but until then I have been able to solve the problem by using the CHKDSK program before each compiler run. This is really only a small inconvenience if a copy of CHKDSK is placed on the scratch disk and a batch file is used to assist with compiling. One batch file I use is shown below":

File PASCAL.BAT:

```
B:
ERASE PASIBF.*
CHKDSK
PAUSE Insert PAS1 disk in drive A
PAS1.%1,,.NUL;
PAUSE Insert PAS2 disk in drive A or press
CTRL-BREAK
PAS2
PAUSE Insert PASCAL.LIB disk in drive A or
press CTRL BREAK
LINK
```

Andrew Wetmore
Charlottesville, Virginia

Spinwriter Printing

In testing the NEC Spinwriter 3530 with the IBM PC and an *EasyWriter* document, we encountered enough severe problems (skipped and misinterpreted characters, erratic margins, loss of words, etc.) to conclude that this printer in its off-the-shelf form is not suited for use with the IBM PC despite both pieces of equipment being labeled as having "industry standard parallel interfaces." In the testing

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process, however, we learned some things that may be of help to readers who already have this or other Spinwriters and may be useful with other printers as well.

Problem: How do you send commands to the printer for underlining, boldfacing, or other printer features? The NEC 3530 will accept commands for its special word-processing features. All the commands begin with the ESC key. However, we could not successfully transmit ESC commands from *EosyWriter*. (Whether the program does not understand the ESC key or the ESC key cannot be transmitted by it, I don't know.) For example, on the NEC 3530, the command to begin underlining is ESC- (hyphen), and to end underlining, it is ESC' (apostrophe). However, if you type these into *EosyWriter*, you will get a - (hyphen) and an ' (apostrophe), and they will be printed as such. The preceding ESC codes have not been transmitted.

We got around this problem by sending the ESC commands through the ASCII code number for ESC and the .USER command in EosyWriter rather than using the ESC key itself. The ASCII code for ESC is 27. To use the .USER commend, you must choose a symbol on the keyboard as a substitute for the ASCII code. Do not choose a symbol you will use in your text, because, once defined as an ASCII code 27, an ESC rather than the symbol itself will be transmitted every time this symbol is typed. For example, using the $, a user command for ESC is:

```
.USER$27(ENTER)
```

To underline, use the $ and the NEC codes as follows:

```
$-This sentence should be underlined.$'
```

On the NEC 3530 this would be printed as: This sentence should be underlined.

The same procedure can be used to access other features of the printer that require use of the ESC codes. On the NEC we tested, underlining, boldface, subscripts, superscripts, and an "alternate character set" of special symbols available on some NEC thimbles were available. Appropriate codes to begin and end eech of these features are:

Feature	Begin	End
Underlining	ESC-	ESC'
Boldface	ESC*	ESC,
Shadowtype	ESC+	ESC,
Superscripts	ESC;	ESC:
Subscripts	ESC:	ESC;
Alternate character set	ESCH	ESCI

In each case the $ (or other symbol you have defined) serves as the ESC. To print a superscript, for example, you would type into EosyWriter: This sentence is followed by a footnote, numbered five.$;5$: This should produce: "This sentence is followed by a footnote, numbered five.[5]"

Any time you need an ESC procedure with *EosyWriter*, this one should work. However, the particular keys used with the ESC may differ by printer and should

WE LEARNED some things that may be of help to readers who have Spinwriters.

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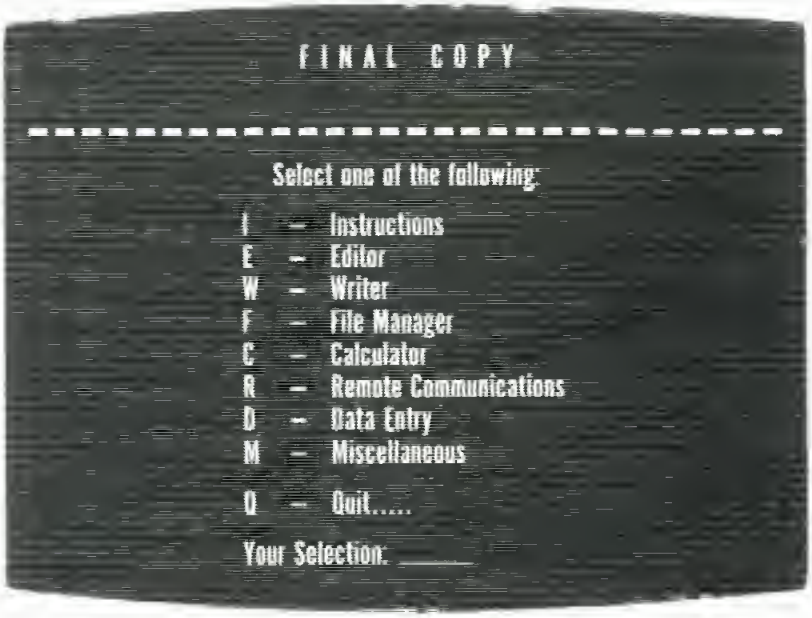

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ba listed in the printer manual. If the printer is not capable of carrying out the above functions, this procedure will not changa its inherent capabilities (e.g., the printer must have half-line feeds and forward and reverse motion to do superscripts and subscripts).

Some NEC thimbles are capable of printing as many as 128 characters, 96 of which are accessed normally through the keyboard. The other 32 are called alternate characters. Most thimbles have no alternate characters on them; some have 25 or 26 and a few have even more. For example, the Super Courier thimble has various fractions in eighths (very tiny numbers produced in the upper part of a line for use in footnoting without having to move the printer carriage up and down), a copyright symbol, and several other symbols in the "alternate character set." To access these symbols, you must use the ESC H and ESC I codes as indicated in the chart above. Since the alternate characters themselves do not appear on your keyboard, you must type the standard character set equivalent of the alternate character directly after the ESC H code and then return to the standard character set with the ESC I code.

On the Super Courier thimble, for example, 2 is the standard equivalent of tha tiny zero, t of the tiny 2, Q of the tiny 6, 4 of the ⅛ fraction. There is no particular pattern of equivalents. You must develop a chart of equivalents for tha particular alternate character set on the thimble you have. This chart can be developed from the printing test pattern produced by the printer, using the thimble in question. The alternate characters will appear on an apparently unpatterned line, and by following up the column in which each one appears until you come to the regular ABC test line, you will find the standard character equivalent for each. NEC produces a brochure that shows the typefaces on all their thimbles. This can be used to find a thimble that has an alternate character sat that will be useful in your application (available ones include publishing symbols, Greek letters, and scientific notation).

To conclude the printer problem discussion we called NEC to find out why tha 3530 wouldn't work properly, especially since we had been advised by an NEC systems enginear and several mail-order companies that it was an appropriata choice. A technical advisor acknowledged the difficulties and informed us that a new model would soon be available, designed specifically for the IBM PC (the NEC 3550). Needless to say, we did not buy tha NEC 3530, and we eagerly await a letter-quality printer that will work well with tha IBM PC. However, the information abova on use of ESC codes and alternate character sets will apply to any printer or thimble that has the capabilities discussed. By tha way, it was a tip in your magazine that alerted us to possible problems. Because of it, we decided to physically test the printer before purchasing, despite expert advice.

Dr. Ada F. Finiftar
Michigan State University
East Lansing, Michigan

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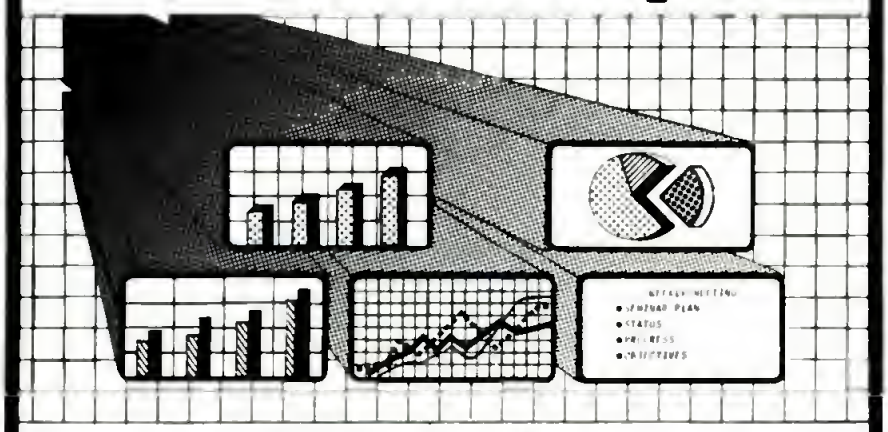

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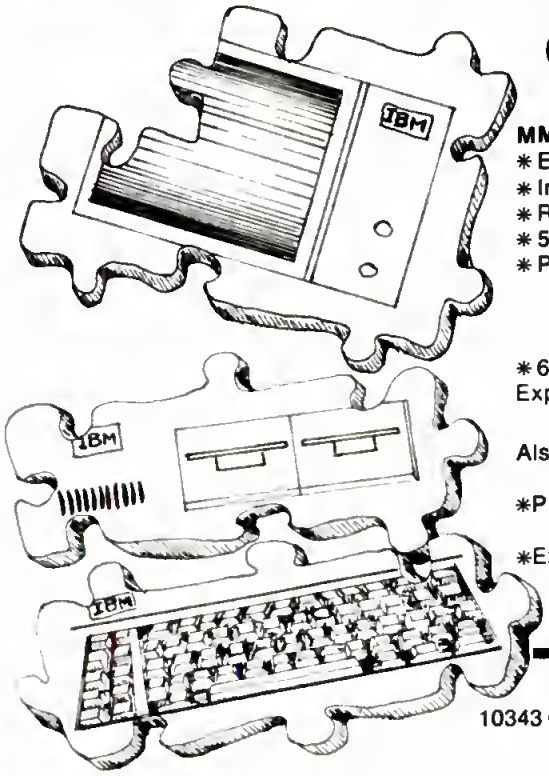

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PC-Talk

An ingenious communications program composed by PC Associate Editor Andrew Fluegelman that is elegantly written, executes without quirk or mishap, and is free for the asking.

Under normal circumstances journalistic ethics would prevent me from reviewing a program written by a friend or colleague. But the unique method that PC Associate Editor Andrew Fluegelman uses to distribute his PC-TALK communications program alleviates my concerns. If you order the program and are disappointed, you've lost nothing but a stamped, self-addressed envelope.

PC-TALK is the debut product of FREEWARE, a software distribution service founded by Fluegelman "as an experiment in economics more than altruism." Fluegelman will return a free copy of PC-TALK to anyone who sends him a formatted disk. Users who like the program are encouraged to send a $25 donation, but they are under no obligation to do so. They are also encouraged to make copies of the program for their friends. Rather than spending energy copy-protecting his disk, Fluegelman included a batch file that allows any PC-TALK disk to automatically copy itself.

Knowing that Fluegelman is not a professional programmer, my first reaction was that it couldn't be as good as the expensive communications programs I had used on my Apple. I was wrong. PC-TALK is elegantly written and performs beautifully. It is easy to use and has all the features I would expect from a communications program.

When you start PC-TALK, you are greeted with a brief message about FREEWARE and asked to "press space bar to continue." You are then provided with the information you need to start. This includes a notation to "press HOME for command summary," and CTRL+ HOME to print complete program documentation. If you request the documentation, a 17-page user's guide is routed to either your screen or printer. Though the documentation is clear and comprehensive, it's almost unnecessary. By pressing HOME, you are given an on-screen command summary that should be sufficient for most users. This summary can be brought to the screen at any time while the program is running.

Features

By pressing keys ALT D, you enter a dialing directory that allows you to store the names and phone numbers of up to 15 dial-up computers or information services. These are written to the PC-TALK disk for subsequent recall. If you have an auto-dial modem (such as the Hayes Smartmodem), PC-TALK will automatically dial any number in your directory. You can also program in special long-distance discount services such as Sprint or MCI. You can separately program the phone numbers for CompuServe and The Source. With an auto-dial modem you dial CompuServe by typing ALT C, or The Source by entering ALT S. If you use ALT S, for example, PC-TALK will not only dial your Source access number, but it will also reprogram the END key as a Source break signal (CTRL P) and the INS key as a Source insert signal (likewise for CompuServe).

TO FULLY appreciate PC-TALK, you have to try it.

The program also allows you to program ALT plus any number key to enter your account number, passwords, or any other commands or statements. When I log onto The Source, I press ALT S for my connection to Telenet, ALT 1 to get to The Source's computer, and ALT 2 to log my account number and password.

Sending and Receiving Files

One of the most important features of "smart terminal" programs is the ability to send (upload) and receive (download) files. Sending takes a file on your diskette and transmits it to another computer. Downloading (PC-TALK calls it "receive") takes data from another computer and stores it on your disk. With PC-TALK this can be done either between a PC and a "host computer" such as The Source, or between a PC and any other microcomputer equipped with communications facilities. We use PC-TALK to receive articles from our authors, some of whom use computers othar than IBM PCs.

When you are receiving a file, the information is written to the disk at frequent intervals. Some communications programs store incoming information in memory and write it to the disk at your command. That's fine unless there is a power failure, another catastrophe, or you forget to give tha command. Because PC-TALK handles this automatically, the size of the file downloaded is limited only by disk capacity (160K for one-sided disks and 320K for double-sided disks).

Variable Baud Rate

Although most personal computer modems transmit and receive at 300 baud (30 characters per second), PC-TALK can operate at up to 2400 baud, which allows you to take advantage of the 1200 baud modems that are beginning to drop in price and become more popular.

Viewing Disk Files

If you're thinking of uploading a file but aren't sura what's in it, you can "viaw" the file. A directory of your disk will select a file for viewing by typing ALT V. Enter the file name when prompted, and the contents of the DOS fila will be routed to your screen without affecting the computer you are communicating with. */PC*

To order o copy of PC-TALK, send o DOS-formotted diskette to FREEWARE, The Heodlands Press, P. O. Box 862, Tiburon, CA 94920. FREEWARE invites program outhors to send descriptions of their progroms. Selected progroms will be included in upcoming FREEWARE cotalogs.

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Down on Accounting? Count/Up Instead!

Hello...My name is Don Buresh.

Several monthe ago I purchased an IBM Personal Computsr. I have been a data processing consultant for the past five years. I want to sell microcomputer software on a reliable machine.

I contacted Algorithmic Engineering with the idea of converting their General Ledger, Accounts Payable and Accounts Receivable package **COUNT/UP**. After talking to Jim Mills and Sylan Rubin, we decided to put **COUNT/UP** on the IBM PC.

COUNT/UP is an accounting package which allows the user to writs accounting definitions that meet a company's needs, while letting the software creats the necessary journale and ledgers.

COUNT/UP originally ran on any 6800 microcomputsr using the DOS6800 operating syetsm from Smoke Signal Broadcasting. **COUNT/UP** was rsviewed in **Infoworld** in the October 5, 1981 issus and received the Software Report Card that you see in the nsxt column.

COUNT/UP consists of 24 programs and 5 menus. The systsm permits up to 750 account numbers. A user can define up to 20 character fielde in a journal transaction, where the length of each field can be up to 24 characters.

On the IBM Pereonal Computer, **COUNT/UP** uses 64K of RAM and two 5¼ inch floppy disk drives. The system employs hash-coded index files which make ths operation of the software extremely fast.

InfoWorld
Software Report Card
Count/Up

	Poor	Fair	Good	Excellent
Usefulness	☐	☐	☑	☐
Documentation	☐	☐	☐	☑
Ease of Use	☐	☐	☐	☑
Error Handling	☐	☐	☑	☐

The documentation is a well-organized manual that fits along side your PC library. The manual provides an overview of the complets system in the first chaptsr. Each chapter begins with a summary of the chapter then guidee the user through the material step by etep. The manual also has an index.

COUNT/UP is one of the few accounting systeme that allows the user complets freedom in the deeign of hie or her ledgers. The syetem has automatic record keeping, together with a video or printed dieplay of a company's records. **COUNT/UP** has expert or novice data entry levels, along with batch processing capability if deeired.

Since the syetsm allows complets freedom when designing the journale and ledgers, the programs in **COUNT/UP** which do Accounts Payable also do Accounts Receivable. We can therefore offer **COUNT/UP** in two packages:

- General Ledger
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JEAN YATES & DR. REBECCA THOMAS

The Visi-Calculator Dream Machine

Visi-Power need not cost too much.

"Visi" power is too expensiva. *VisiCalc* and its "visiclonas" require personal computer configurations that cost over $2,000. Although much less expensive than equivalent programs that used to be available on minicomputers only, *VisiCalc* is not the ultimate, low-cost value for functionality.

We have a dream machine—the "Visicalculator." Dedicated visipower should be portable and inexpensive. Too many companies spend $2,000–$4,000 on a personal computer that runs only *VisiCalc*—a rather large expense, even if the machine is used frequently. Also, visipower requires a rather large and bulky machine, and most of us would like something that fits more easily onto our desk, along with piles of paper and reference documents. The visicalculator would be such a solution —a logical extension of the "visi" phenomenon. If someone else doesn't market one quickly, perhaps we will.

Calculator Characteristics

The visicalculator would have sevaral basic characteristics. Clearly, it would be a dedicated machine; it would not attempt to be a full-fledged computer but offer only one function—visicalculating. The product as we see it should be portable, maybe even hand held, and use a LCD display like one available from Cockroft International, a Sunnyvale-based LCD rasearch firm that offers a 16-line, 80-column LCD display that runs on a battery.

A detachable printer would be an interesting part of the total package, and communications between the machine and a larger, traditional personal computer would be necessary so larger amounts of data could be calculated with the addition of disk storage, etc.

This machine should be battery operated, which is why we suggest the LCD display from Cockroft, manufactured with a technology called CMOS that uses very little power (the batteries last a long time).

Cost

Most importantly, the cost should be $600 or less, bringing it into the range of hand-held computers and scientific calculators. The difference between our suggested machine and the existing Panasonic and Radio Shack hand-held computers, for example, is the large LCD display and the dedication to one function. The HP-41C series, which communicates with the HP-85 personal desk-top computer, is an example of the kind of communication we think this product should have.

We know the suggestion of a $600 visicalculator will meet with cries of: "But there are some basic technological problems of data storage and RAM needs that must be handled." The same kinds of complaints and arrogance were exhibited by many computer manufacturers who viewed a $3,000 configuration for financial modeling totally impossible about 5 years ago. With several hundred thousand copies of *VisiCalc* and its visiclones sold to the public, this premise has been proven wrong. Prediction: A $600 visicalculator will be possible, practical, and very profitable in the near future. */PC*

Jean Yates and Rebecca Thomas, Ph.D. are co-authors of A User Guide to the UNIX System (OSBORNE/McGraw-Hill, 1982). They are presently working on a series of books related to the UNIX and 16-bit operating systems.

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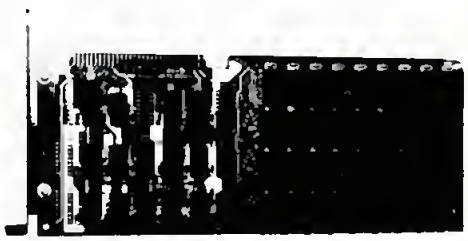

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A Tool For The Layperson

This book will provide hands-on experience beginning with chapter one.

IBM Personal Computer: An Introduction to Programming and Applications
Larry Joel Goldstein and Martin Goldstein; (Robert J. Brady Co.)
302 pages; $14.95

The Goldsteins, father and son, to judge by hints in the preface, have written a book for beginners, and it is quite good. Its 14 chapters cover 261 pages, and the remaining pages contain answers to the book's many exercises as well as a thorough index. The lack of a glossary is a weakness, although a minor one, since the Goldsteins have done an excellent job of avoiding jargon. Imagine an introduction to programming in which the word "algorithm" does not appear even once.

The Goldsteins' book also looks like a textbook, not surprisingly, since Larry Goldstein teaches at the University of Maryland. The book's instructional design is admirable. First a topic is discussed. Next a typical problem is defined and solved by the author. "Test Your Understanding" exercises are presented for the reader to solve for himself, and the answers to these appear boxed within a few pages. Finally, problems are given for the reader to work through, and solutions are given for most, but not all of these, in the back of the book. In each of these steps the material becomes a little more difficult so that the reader who takes the trouble to do all the exercises should come away from each chapter with a command of the programming skills covered in it.

In the process, however, the reader will have encountered one or two annoyances. Understandably, some answers to problems are omitted in the back of the book, for instance where the reader is asked simply to run a program to see what the results are. But in other cases, answers were left out that should have been given. One cannot help suspecting laziness. The suspicion is heightened upon noting some typographical errors, especially in the program listings. These may be innocent oversights on the part of the author or proofreader, but they are at best confusing to the novice struggling with an unfamiliar mathematical concept and at worst fatal bugs for the beginner who tries to run a program. Those that I noticed were on pages 80, 82, 84, and 208. Also on page 140 a program line is given as line 50, which would more logically be numbered line 45.

The salient characteristic of this book is that it is for beginners. The second is that it is about programming and applications. Hardware discussion is kept to the minimum required to fire up the machine. The bare skeleton of machine anatomy is sketched—input, output, memory, and the CPU. As much attention is given to mass storage on cassettes as on disks, testimony to the Goldsteins' sympathies for the low-budget user, something often lacking in IBM publications. The difference between RAM and ROM is briefly explained. The need for one or two interfaces is mentioned in passing. The authors frequently beg off from pursuing a subject with the apology that it would be beyond the scope of the book. For example, the discussion of Disk BASIC is incomplete. Random access files are not discussed at all. Interested readers are directed to the reference manual that comes with the machine.

Primarily, this is an introduction to the IBM PC dialect of BASIC. Chapters 2 through 11 cover the commands, use of files, the line editor, graphics, and so on. Chapter 10 on simulations is especially good. It is rare for a beginner's book to offer much about simulations at all, let alone a detailed and very clear construction of one. This program simulates business in a dry cleaner's.

Time is measured in 4-minute increments through a 10-hour day, for one week. For each 4-minute time period the program records the number of sales made and the number of sales lost owing to slow service. In the end the program produces figures showing that the amount of lost sales justifies hiring an extra salesperson.

The program is written in steps that progress logically, each step taking the student only one level beyond the last, another example of the good instructional design that characterizes this book. It is also characteristic of the kind of programs used throughout, in the various lessons. Most of them are primitive but useful applications for home or business: a crude word-processor, a program that computes wages and deductions for a small payroll, another that files and retrieves recipes, another that converts monthly profit figures into a bar chart for graphic display. The chapter on games lists programs that play tic-tac-toe and roulette.

Chapter 4 is also worthy of special mention. It is entitled "Easing Program Frustration" and covers flow-charting, debugging, and a very thoughtful list of the

BASIC Programming Kit

The Kit, IBM Personal Computer BASIC Programming Kit
Larry Joel Goldstein and Martin Goldstein
(Prentice-Hall, 1982); $34.95

For those not quite adept at keystroke operations, The Kit is an all-inclusive program designed for the novice. Developed by the authors of *The IBM Personal Computer: An Introduction to Programming and Applications*, it includes the text plus an accompanying diskette. All 37 applications described in the book are on disk, eliminating keystroke errors and allowing you to modify and examine the programs as you go. Designed for easy use, The Kit is an informative yet refreshingly informal approach to programming and applications. —*C.H.*

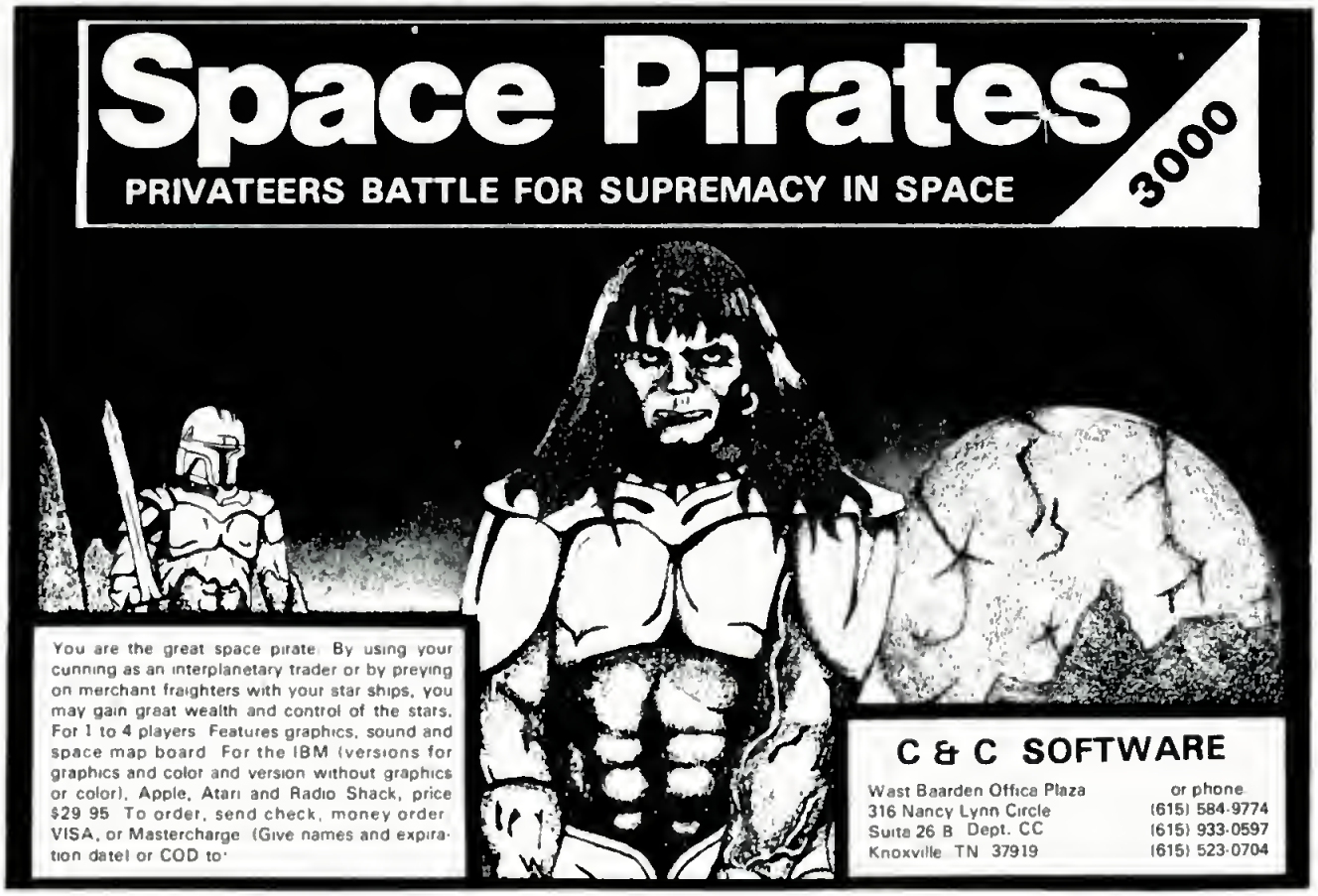
various error messages explained in simple English. The Goldsteins might have given more space to planning a program, however. Flow-charting is more prevalent than they suggest. Objectives should be carefully defined and written down in the form of a design document. Flow charts should be worked through more than once to make sure they satisfy the design. Every effort should be made to foresee the myriad hard-to-predict difficulties that crop up in the course of developing a piece of software. The Goldsteins use this kind of planning themselves, at least in a simple way, and demonstrate it, notably in writing the tic-tac-toe program in the chapter on games, but it would have been a service to the novice if they had mentioned this aspect of programming explicitly.

The last three chapters briefly cover commercial software, other applications, and suggestions for further study. The first of these briefly mentions *EasyWriter*, the word-processor from Information Unlimited Software, which is sold by IBM for the PC, and *VisiCalc*, the spreadsheet program from VisiCorp (referred to in the book by its old name, Personal Software, Inc.). The discussion of *VisiCalc* is an excellent introduction to the most popular piece of software written for microcomputers to date. The essence of how *VisiCalc* works is explained in a few concise paragraphs. The Goldsteins offer some useful tips on buying software, suggesting that the consumer begin with a clear idea of his or her needs, study reviews, compare documentation.

IMAGINE an introduction to programming in which the word "algorithm" does not appear.

The chapter on further applications goes into peripherals, but only briefly. The authors explain the difference between serial and parallel communications and give one of the best short explanations of what the RS-232-C interface is. They include the all-important but so often neglected caution that the RS-232-C is standard only up to a point; it always has 25 pins, but a given pin by no means always carries the same kind of signal. Then they devote a couple of paragraphs each to data bases, the PC's advanced graphics (one of those subjects of which a discussion in detail was beyond the book's scope), and modem communications.

The last chapter is only a couple of pages long but manages to explain the distinction between a compiler and an interpreter, the difference between source code and object code, and what a mnemonic is. If you already know what these are, you probably would not be interested in this book. But if you don't know and you want to, this book may be just what you need. */PC*



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Book Briefs

UNIX Offers Powerful Networking

A User Guide to the UNIX System
Rebecca Thomas, Ph.D. and Jean Yates
(OSBORNE/McGraw-Hill)
508 pages; $15.99.

UNIX is a powerful operating system originally developed at Bell Laboratories. Bell developed UNIX to allow more than one user to access its mainframe computers at one time, and to provide interactive access—immediate response to the user's input. Since its inception in 1969, UNIX has evolved into a widely used system that provides a large number of applications through its own internal programs; offers powerful networking among many users of one computer or of a number of computers linked together; and has been adapted by a number of companies to be used on mainframes, minicomputers, and microcomputers, or on combinations.

UNIX is a highly evolved system and, along with CP/M, the closest thing presently available to a standardized operating system. UNIX, or something like it, will play an increasingly important role as businesses adopt the marvels of the automated office, in which everything is linked to everything else electronically.

Dr. Thomas and Ms. Yates have given us a lengthy and thorough handbook on UNIX. The book is divided into sections. The first is a set of tutorials designed to teach the reader, as he sits at a console and tries each tutorial on his own computer, the ins and outs of UNIX (Version 7). The second section goes through the UNIX commands, over 200 of them, and also contains tutorials.

This book is for those who want to learn how to operate UNIX. They are a relatively small group at present, but as we all become networked together, their numbers will grow, and this clear, well-organized manual may become a classic.

A Usable WordStar Manual is Born

Introduction to WordStor
Arthur Naiman (Sybex)
202 pages; $11.50 plus $1.50 handling.

This is another book spawned by the incredibly inadequate manual that accompanies WordStor. Mr. Naiman has done a creditable job of making this word-processor accessible to users.

One nice touch is that the very first page of the book is a flow chart of the entire WordStor system. It is a readable flow chart at that: The boxes are rounded at the corners, and the arrows are curvy and pleasing to the eye. Avoiding jargon, Mr. Naiman calls his flow chart a "map" of WordStor. This innovation of Mr. Naiman's is both apt and worthy of imitation, and it sets the tone for the book.

Mr. Naiman is a professional writer and the book shows it. His style is breezy and friendly, and his descriptions are clear and comprehensive. The book consists of 13 chapters, seven appendices and two indexes. Illustrations are copious, including many sample screen displays and another nice touch: In the page margin next to the description of a command are pictured the keys that must be punched to give that command.

Mr. Naiman's treatment of WordStor covers everything, from the "Getting Started" chapter, the title of which is becoming a technical writing cliche, through WordStor's global search functions, mail-merge capability, and spelling verification. If you have WordStor or want to get it, this book will probably save you many hours and a great deal of frustration.

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New On The Market

HARDWARE

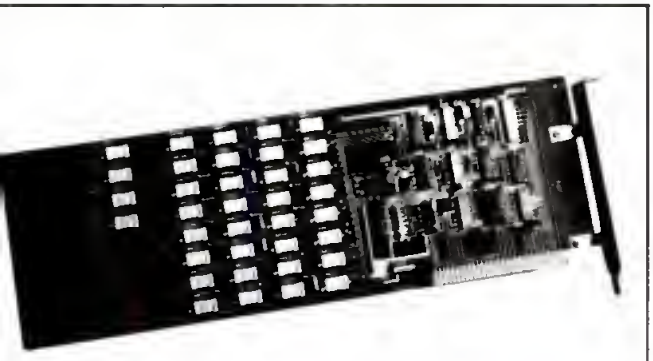
Memory Boards

Micro Match offers four new memory expansion boards in its MM64 series. These boards are available with 64K, 128K, 192K, and 256K of RAM; all have a 5-year warranty. The manufacturer also supplies a memory test disk and a 17-page manual with detailed diagrams and installation information, including instructions for users to add RAM chips. Each board was tested for 168 hours before shipment.

Requires: PC with 64K memory.
List Price: MM64-1 (64K), $400; MM64-2 (128K), $510; MM64-3 (192K), $620; MM64-4 (256K), $730.
Micro Match
10343 Commerce Ave.
Tujunga, CA 91042
(213) 353-5929

Two types of memory expansion boards are new from Chrislin Industries. The CI-PCM is an add-in memory board available in configurations of 64K, 128K, 196K, and 256K. The CI-PCM+ is a memory expansion board that also contains an RS-232-C port. This board is supplied in configurations of 64K, 128K, 258K, and 512K. The manufacturer offers a 1-year warranty on parts and labor for these products.

Requires: PC with 64K memory.
List Price: CI-PCM (256K), $895; CI-PCM+ (512K), $1,595.
Chrislin Industries, Inc.
31352 Via Colinas, #101
Westlake Village, CA 91362
(213) 991-2254



MM64-4 expansion board with 256K of memory from Micro Match.

Hard Disk

United Peripherals has announced a 5-megabyte hard disk with an added feature—it can be used with many different computers, including the PC. The UP-9705 is a separate, self-contained unit that comes with its own power supply and disk controller. The universality designed into this hard disk makes it potentially very useful for businesses or individuals who have two or more different computers.

Requires: PC (preferably with at least one disk drive).
List Price: $2,995.
United Peripherals
432 Lakeside Dr.
Sunnyvale, CA 94086
(408) 730-4440

Intel 8087 Chip

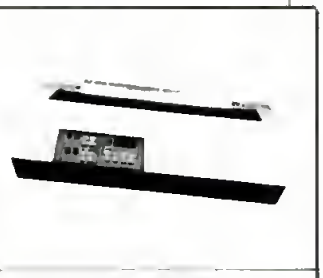
Moth Master, a combined hardware/software product from Sun Coast Data Sciences, provides the number-crunching abilities of a high-speed mathematics chip, the 8087 microprocessor (see *PCommuniques* for additional details). This chip fits in an empty slot on the PC's motherboard and is supplied along with a matched 8088 microprocessor that replaces the PC's current 8088 chip. *Moth Master* also includes software that supports programs written in FORTRAN, COBOL, BASIC, and assembly language, plus complete documentation and instructions for installing the new chips.

Requires: PC.
List Price: $450.
Sun Coast Data Sciences
680 Center St., Ste. B
Costa Mesa, CA 92627
(714) 631-9241

Printers

A high-speed dot matrix printer, which features 9 by 7 characters with true descenders, is available from DataSouth Computer Corporation. The DS180 has both serial and parallel interfaces, prints bi-directionally at 180 characters per second, and has selectable baud rates of 110 to 9600. A front-panel keypad allows users to program up to 50 features, which are stored within a nonvolatile memory that is not lost when the printer is turned off. The manufacturer can supply the cable needed to interface the PC's parallel port to the printer.

Requires: PC with printer controller and parallel port; cable available from manufacturer.
List Price: $1,595.
DataSouth Computer Corp.
P.O. Box 240947
Charlotte, NC 28224
(704) 523-8500



DataSouth DS180 dot matrix printer

TrimForm serial matrix printer from Mannesmann Tally.

A new multifunction serial matrix printer is available from Mannesmann Tally. The M 78-5 TrimForm printer has a built-in cutter that can trim printed

New on the Market does not review products, but reports information provided by the manufacturer. If you have a product that you would like to have included in this section, please send a brief description that includes applications, price, and system requirements to New on the Market, PC Magazine, 1528 Irving St., San Francisco, CA 94122. Photographs and illustrations are run on a space-available basis.

New On The Market

forms to specified sizes, so that unusuelly shaped items cen be prepared eesily. This versatile printer also produces a variety of type styles, including the speciel type for opticel charecter readers, bar codes, and large lettering that can be three, five, or seven times the normel character size. Tha TrimForm prints at speeds of up to 200 cheracters per second, depending on the style end size of type being reproduced.
Requires: PC with print controller and serial interface; may require special cable (contact dealer or manufacturer).
List Price: $4,345.
Monnesmonn Tolly
8301 S. 180th St.
Kent, WA 98031
(206) 251-5524

Tha Brothar HR-1 is e reletively inexpensive deisy wheel printer that performs bi-directional printing et 16 cheracters per second. This printer features speciel daisy wheels that are enclosed in a cassette-type holdar for eesy instellation end chenging; some 15 type styles in three sizes are currently available in cassette farm. The HR-1 is availeble with e choice of three interfaces: parallel, serial, and one compatible with the Qume Sprint 3 printer.
Requires: PC with printer controller end eppropriate intarface.
List Price: Parellel or Qume interface, $1,100; Sarial intarface, $1,200.
Brother, c/o Dynox
333 S. Hope St., #2800
Los Angeles, CA 90071
(213) 770-0570

Game Controller

TG Products offers a joystick for games that hes been teilored specifically for the PC. Its custom design ellows the joystick to cover the complete input range for the PC, and its two large buttons meke for eesy handling. This product is color-coordineted with the computer.
Requires: PC, geme edepter.
List Price: $64.95.
TG Products
1104 Summit Ave., #106
Plano, TX 75074
(214) 424-8568

New joystick for PC gomes.

Power Protection

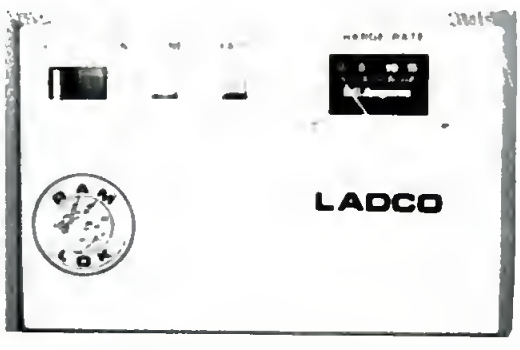
The RAMLOK is a standby power controller and line voltage monitor thet eutometically switches to an auxiliery power supply if insufficient power is reeching the equipment. The RAMLOK must be used in conjunction with a maintenance-free, lead acid auto or marine battery (not supplied with this product); if the normal power supply is interrupted or voltage goes above or below acceptable limits, RAMLOK eutomatically shifts to the standby battery for power. The contents of the computer's memory are not lost, and the backup battery can provide up to 30 minutes of power so thet all date can be safely stored on disk. This power-supply controller can be ordered in five configurations, verying from 250 to 1,000 watts and 115 or 230 VAC.
Requires: PC and meintenence-free euto or marine battery.
List Price: $375 to $865, depending on configuratian.
Ladco Development Compony
P.O. Box 464
Oleon, NY 14760
(716) 372-0168

Three new power-supply protection devices are available from Electronic Specialists. The Super Isolator Model ISO-11 features six sockets in two separete filtered benks (three sockets eech) to guard against power spikes, surges, or interferance.

The Magnum Isolator Model ISO-17 offers four individuelly filtered sockets for maximum power-supply protection from spikes, surges, or pollution caused by electrical equipment.

A two-sockat model, the Direct Plug Super Isoletor, plugs directly into the wall outlet and provides power-line protection for computer components. A screw in tha unit can be attached to the well socket so the isoletor cen't be dislodged accidentelly.

This supplier mainteins e toll-free Interference Control Hot Line for microcomputer users; call (800) 225-4876, 9 a.m. to 4 p.m. EST on weekdays for assistence with power-supply interference problems.
Requires: PC, grounded outlet.
List Price: Super Isoletor, $104.95; Magnum Isolator, $181.95; Direct Plug model, $96.95.
Electronic Speciolists, Inc.
171 S. Moin St., P.O. Box 389
Notick, MA 01760
(617) 655-1532



Standby power-supply controller for micros.

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Supplies

EDP Staticide is a liquid that can be sprayed from its non-aerosol container to eliminate static alectricity in the computer room. This spray leaves no residue and is not toxic or flammable; it will last 2 to 4 months on haavily used surfaces and up to 6 months or longer in less travaled areas.
List Price: $8 par quart.
ACL Inc.
1960 E. Devon Ave.
Elk Grove Villoge, IL 60007
(312) 981-9212

SOFTWARE

General Business

A group of four programs, collectively called *The 25th Hour*, is dasigned to halp business people work mora effectivaly.
25:01—*Time Scheduler/Orgonizer* is a time management systam for regular activities and one-tima-only events. This program provides reminders of scheduled commitments, notes any time conflicts, blocks out specified periods, and can print daily, waekly, and monthly calandars.

Extensive prompts and onscrean menus make *25:01* aasy to use, and tha raference manual datails the program and suggests applications.

25:02—*Magazine/Book Reference* is an indax system for magazine articles and books. Publication data is organized by name of author, magazine or book title, topic and subtopic, and up to *80* characters for a comment. The publication list can then be scanned for all entries from a particular publication, author, topic, or subtopic, as wall as for specific key words or phrases in all references.

25:03—*Fixed Asset Monoger* creates an index of assets by classification, location, and asset number. Each entry includes a description, cost, current valua, depreciation to date, in-service data, useful life, and salvage value; tha user can selact from built-in dapreciation methods or create customized methods, as well as list the assets according to class, location, or number. This program is designed for indexes of business and personal assets.

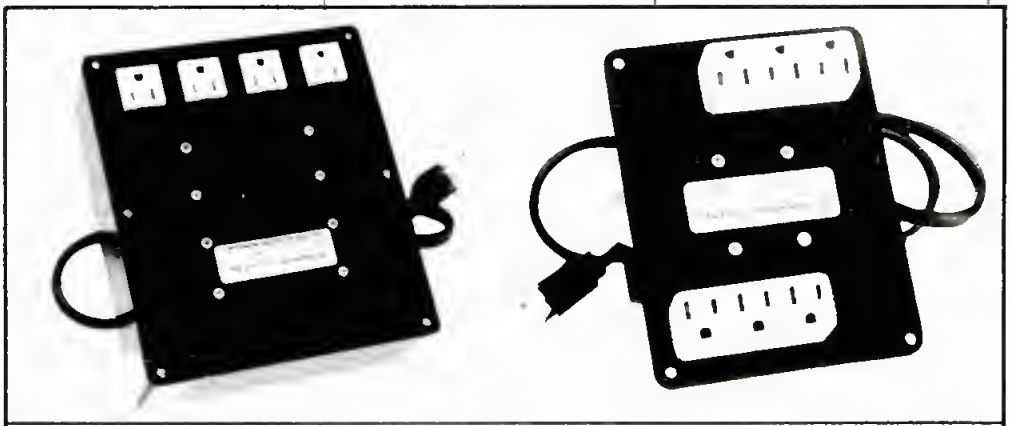
25:04—*Finonciol Colculotor/Anolyzer* is a financial management program that calculates present and futura values of investments, loans, and annuities, proratas amounts for specific periods, and handles complex and simple interest calculations. This program features "what if" calculation powers, display or printing of amortization schedules, and figuring of bailoon peyments. Manus, prompts, and a detailed manual make this program easy to use for both business and personal invastment calculations.
Requires: PC with 64K RAM, one or two disk drives, *80*-column monitor, PC-DOS, Advanced BASIC, and parallel or serial printer.
List Price: *25:01*, $99; *25:02*, $69; *25:03*, $119; *25:04*, $89.
Softrend, Inc.
P.O. Box 1462
Chorlottesville, VA 22902
(804) 293-5344

Two programs from Compumax help businesses cope with thair goods. The *Bill of Moteriols* is an invantory control and matarials requiramant program for small businesses. Its features include a Materials Requirement Planning Report, ABC Analysis, and Maximum/Minimum Raport, and a stock status report for valuing stock at cost, retail, and discounted retail.

Microinv is an invantory control program that creates an inventory master file, as well as Stock Status and Valuation, ABC Analysis, and Job Cost Reports. This program also calculates economic ordar quantities.
Requires: PC (no minimum memory specified), one or two disk drives, printar.
List Price: *Bill of Moteriols*, $350; *Microinv*, $140.
Compumox Associotes, Inc.
P.O. Box 1139
Polo Alto, CA 94302
(415) 854-6700

Base Management

RMS is a data base management program designed for ease of use and versatila record kaaping. Users can create or modify their own data entry formats on tha scraan and antar data in specified spaces. Records can ba accessed by key field and printed according to the user's directions. *RMS* is written in assembly language for speed of execution.
Requires: PC with 48K RAM, one or two disk drives, monochroma or color display, DOS (printer is optional).
List Price: $395.
Woshington Computer Services
3028 Silvern Ln.
Bellinghom, WA 98226
(206) 734-8248



Isolotor for power-supply protection from Electronic Speciolists.

Accounting

Plus Computar Tachnology offers a group of accounting programs for the PC. Thts selection of software works as a systam, with automatic posting to the *General Ledger* program, or each accounting program can function as a stand-alona unit. Tha system includes Ganaral Ledger, which features user-designed formats and supports up to 50 journals, 5-digit account numbers, and monthly budgets.

Accounts Payable provides a complete analysis of aged vandor invoices, future cash raquiremants, and praliminary

New On The Market

check register to show amount of cash disbursemant. Paymants may be mada by vandor, invoice, due date, or discount dates.

Accounts Receivable records sales activity for current end preceding year; calculates commissions, discounts, and sales tax extensions; and monitors accounts by tarritory or salesperson. Credit information includes average number of days to last payment, current status, previous purchase and payment dates, and credit limits.

Fixed Assets provides eight different depreciation methods for book and tax depreciation with the ability to forecast up to 3 years into the future. Thls program produces monthly and year-end reports, as well as IRS-required information. The Investment Tax Credit portion of the program can be changed by the user to reflect any changes in tax laws.

Poyroll handles waekly, biweekly, semimonthly, and monthly payrolls, along with fixed and one-tima deductions and employee payment by salary or hourly wage. This program processes all required tax forms for emplayees, including local, state, and federal information, and provides a password system so that all payroll data remains confidential.

Easytrak is a tracking system that monitors sales activity by product line, salesperson, territory, customer, or in combinations of these variables. Sales can be followed daily, weekly, monthly, or yearly, and sales racords can be compared and analysed on screen.

All Plus programs feature extensive menus and documentation, as well as telephone hot line support.
Requires: PC with 48K RAM, two disk drives, 80-column display, and 132-column printer.
List Price: Ceneral Ledger, Accounts Payable, Accounts Receivable, Fixed Assets, and Payroll, $325 each; Eosytrok, $125.
Plus Computer Technology, Inc.
6900 N. Austin Ave.
Chicago, IL 60648
(800) 323-4240

Several new accounting programs are also offered by Compumax. *Moxiledger*, a general ledger program that provldes automatic double entries, report of change in financlal position, balance sheet, and profit and loss statements, with current, month to date, and year to date totals.

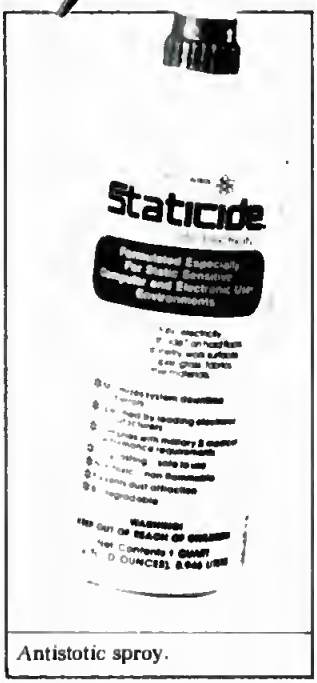
Order Entry documents and controls sales and purchase orders, keeps sales and purchase order histories, lists outstanding orders, and prints invoices.

Microledger is a general ledger designed for small businesses. The program generates trial balance and audlt trail, balance sheet, and profit and loss statements.

Micropoy is an accounts payable program that features report of cash requirements and a statement of accounts payable by vendor and dete. This program also prints the checks.

Microrec is an accounts raceivable program that offers aged triel balance, statement of accounts receivable by customer and date, and customer statements.

Micropers is e personnel payroll program for both hourly and saiaried employaes. The program calculates federal and California withholding taxes and other deductions, as well as gross and net pay; the program also prints paychecks and W-2 forms and providas date for other standard payroll reports.
Requires: PC (no minimum memory stated), one or two disk drives, printer.
List Price: Moxiledger and Order Entry, $350 each; Microledger, Micropay, Microrec, and Micropers, $140 each.
Compumox Associotes, Inc.
P.O. Box 1139
Polo Alto, CA 94302
(415) 854-6700



Antistotic sproy.

Stock Market

Millionoire is a stock market simulation game that teaches the players about finance and investing whila providing entertainment. The menual features a tutoriai so that stock market neophytas can play, and tha game includes margin accounts, call and put options, stock and industry graphs, new raports, volume indicators, company histories, and buy and sell transaction reports.
Requires: PC with 64K RAM, one disk drive, PC-DOS, and monochroma or color display.
List Price: $49.95.
Micro-Z Applicotions
22704 Ventura Blvd., #141
Woodland Hills, CA 91364
(800) 835-2246, Ext. 101

Municipal Finance

MuniFinance Systems is a series of programs that perform the analysis necassary to structure municipal bond issues. These seven programs are designed for use by investment bankers and financial advisors who prefer on-site microcomputer analysis to off-site timesharing with larga computers.
Requires: PC (no minimum memory specified), ona or two disk drives, printer.
List Price: $10,000.
B.A. Nicholson & Company
271 Madison Ave., #1007
New York, NY 10016
(212) 889-7535

Languages

A new extension of the *BASIC* language, *BASIC'*, has baan developed for programmers. A unique system of indentation eliminates the need for extraneous statements, such as BEGIN and END, and statement numbers. Comments ere right-justified, making them easy to distinguish, and blocks and procedures are set off by indentation or blank space so that tha flow of the program is readily apparent. A progrem is created with Editor' and is then translated into a conventional BASIC program (with a listing that cross-references BASIC' and regular BASIC).
Requires: PC (no minimum memory or disk requirements noted).
List Prica: $129.
Delto Micro Systems
P.O. Box 15952
New Orleans, LA 70175
(800) 535-1814

Visual Programming

Micro Focus offers three visual programming tools for programmers working with COBOL. The *Animator* program displays the source code on the screen with

tha cursor moving from statament to statement as the execution proceeds. This allows the user to follow the logic of a program and eases the task of dabugging.

Slideshow allows the user to create visual aids, such as menus, text slides, and still or moving graphics slides. Thesa visual aids can ba linkad to en applications program, and batch-oriented applications can be made interactive.

Forms-2 automatically generates the source code required for screen handling. As tha user "paints" the screen, this program generates standard record dascription statements that can be copied in an applications program.

Requires: PC (no minimum memory noted), ona or two disk drives, CP/M-86, Micro Focus COBOL.

Micro Focus
1601 Civic Center Dr.
Sonto Clora, CA 95050
(408) 496-0176

Graphics

Tha Frieze program from Starside Engineering is a graphics aid that can take a pattern on the PC's graphics screan end save it es a disk file or send it to an appropriate graphics printer. Tha program requires less than 1K of RAM and can be loaded when the computer is turned on; it resides below the DOS. Frieze radefines the PC's Print Screen key for graphics and can salect from any of the nine graphics patterns that may be stored in its disk file. Error messages, which would ordinarily be displayed on the screen, are indicated by coded sequences of beeps from the PC's speaker. This program may be used with any applications program that runs with PC-DOS.

Requires: PC (no minimum memory noted), one or two disk drives, PC-DOS.

List Price: $55 plus $3 postage.

Storside Engineering
P.O. Box 8306
Rochester, NY 14618
(716) 461-1027

Communications

Move-It is a communications program that anables tha PC to transfer files to and from other PCs, as well as any other computer running CP/M, CP/M-86, MP/M, or MP/M-86. Move-It is available in PC-DOS and CP/M-86 versions for the PC. The program can transfer all types of data, including .COM files, over phone lines or standard RS-232 lines. Other program features include the ability to display local and remote directories and dumb terminal emulation for connection to tima-sharing systems.

Requires: PC with one or two disk drives, PC-DOS or CP/M-86, communication card, modem.

List Price: $150 plus $2 shipping.

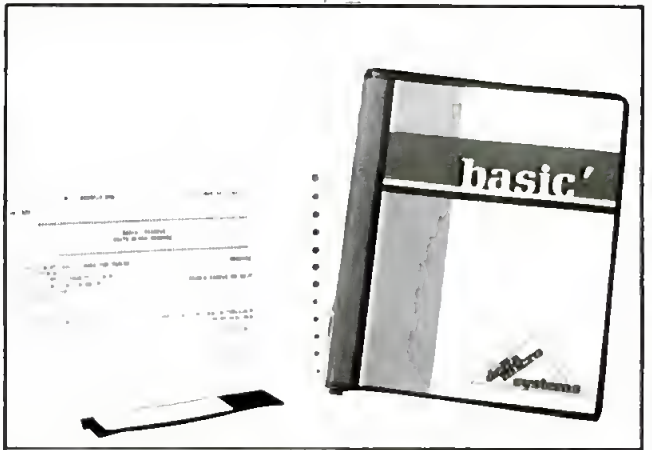
Woolf Software Systems
23842 Archwood St.
Conogo Pork, CA 91307
(213) 703-8112

EM3780 is a ramota job-entry station emulator for tha PC. This program may be used with any host computer supporting the IBM 2780/3780 BISYNC protocol. EM3780 works with any of the PC operating systems that support BASIC.

Requires: PC with 48K RAM, one disk drive, PC-DOS or CP/M-86, and the Advanced Communication Card manufactured by A.S.T. Rasearch of Irvine, California.

List Price: $650.

Wilmot Systems, Inc.
122 E. 42nd St., #205
New York, NY 10168
(212)661-3063



BASIC'.

Utilities

A new program from M.A.P. Systems permits herd-copy printouts of any screen content on the Epson MX-80 with Greftrax or tha MX-100 printer. This utitity program repiaces tha normal Print Screen function and allows printing of images upright or rotatad 90 degraes, as well as double-expanded images upright only. The full IBM character set can be reproduced on one of the printers specified for this program as wall. The program can easily be loaded into PC-DOS and does not affect normal operation of the PC.

Requires: PC, one or two disk drives. Epson MX-80 printar with Craftrax or Epson MX-100 printer.

List price: $34.95.

M.A.P. Systems, Inc.
1120 NASA Road One, #444
Houston, TX 77058
(713) 333-9640

Books

OSBORNE/McCraw-Hill has announced two naw books for the PC. The IBM Personol Computer User's Cuide by Lyle J. Craham is scheduled for September releasa. This volume includes an overview of PC hardware and softwara, comprehansiva operating instructions, and datailed explanations of the computer's internal operations. Also included are tutorials in IBM BASIC. For more advanced users, the author also covers BASIC programming, DOS, graphics and sound, printer and I/O interfaces, and machine language. This book also contains complete cross-references to the PC manuals.

Some Common BASIC Programs, IBM Personol Computer Edition by Peter M. Burka contains 76 practical programs for the PC. This book follows the format of othar editions of the "Common BASIC Programs" series, supplying financial, statistical, and mathematics programs as well as home budgating and organizing programs. Each program contains a description, operating instructions, and BASIC source code listing.

List Price: User's Cuide (385 pages), $16.95; BASIC Programs (195 pages), $14.99.

OSBORNE/McCraw-Hill
630 Bancraft Woy
Berkeley, CA 94710
(415) 548-2805

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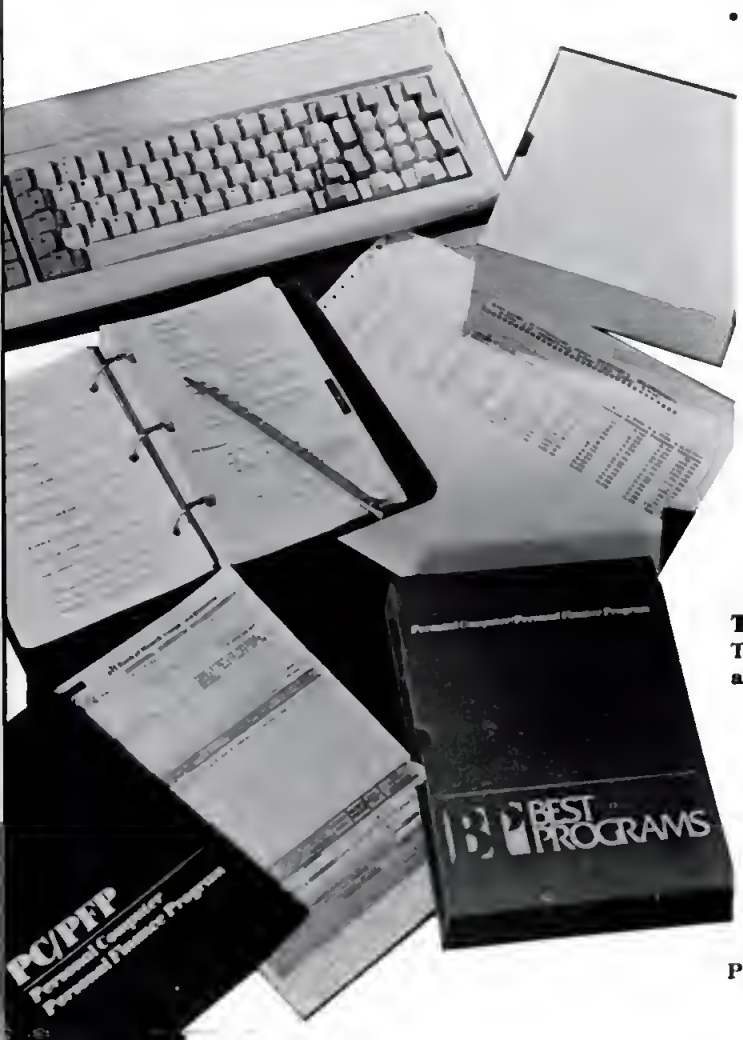

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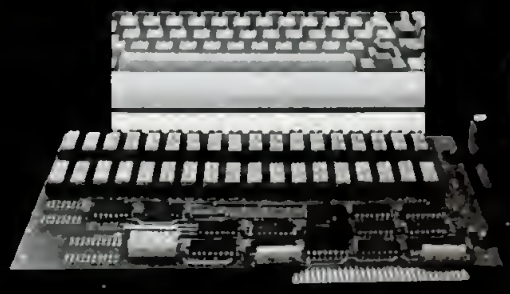

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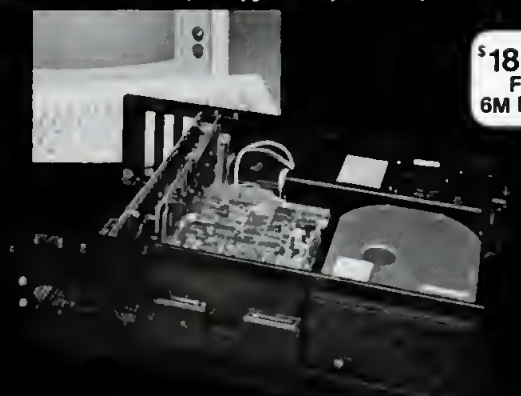

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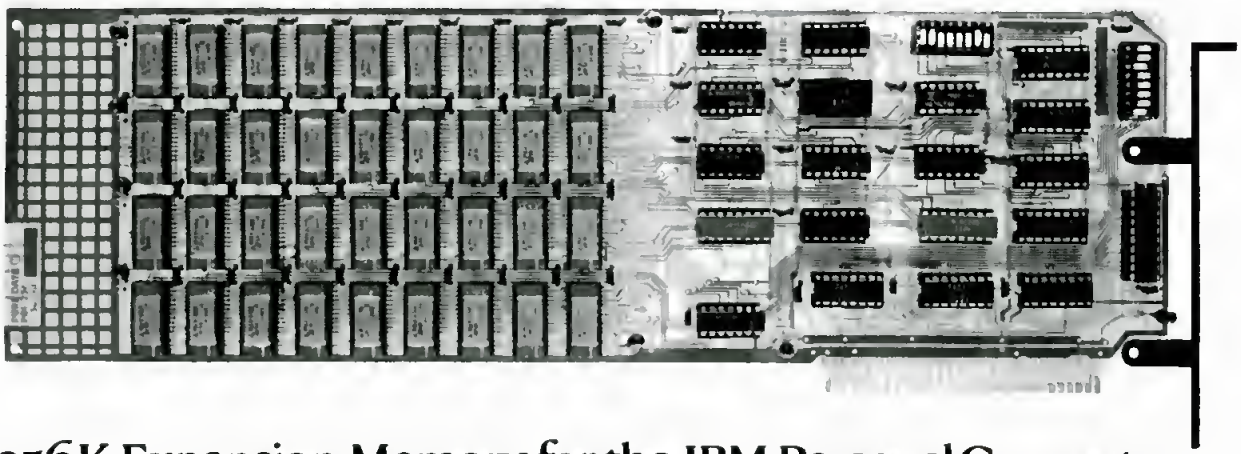

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BOB RICE

PC Tutor

Double characters, graphics symbols, bugs in the backspace? What to do? Here are some helpful suggestions.

Shifting the Display Screen

Q: I'm using a video monitor for a display on my PC. Each time I turn on my machine or reset the system I must manually enter the MODE statement under DOS so I won't lose the first two characters on the left side of my screen. When running VisiCalc or EasyWriter, I can't even enter the MODE statements. Is there an easy or permanent way to shift the display screen?

Jim Purtell
New York, New York

A: *Yes Jim, there is a way to solve your problem. When using any diskette formatted under DOS, you may utilize the autoexecute or AUTOEXEC.BAT batch file. This is a powerful command that allows you to have certain DOS commands and BASIC programs run automatically each time your system is turned on or reset. By inserting the MODE statement in an AUTOEXEC.BAT file on each diskette, you will have the display shifted the proper number of characters without having to do it manually. Inserting the MODE statements in existing diskettes for applications programs such as VisiCalc and EasyWriter requires specific procedures, and I'll get to those in a moment, after giving a brief explanation of the MODE statement as it is used with a display screen.*

There are several ways to shift the position of the first character on a display screen when using the color graphics adapter. The most efficient way is to use the DOS MODE statement. To determine how many characters to the right you need to shift the display, enter MODE 80,R,T while using the color graphics adapter. (If you are utilizing both a color monitor and the monochrome display, you will not be able to utilize this procedure. DOS will operate only on the monochrome display, and the number of characters to shift will have to be determined by trial and error, entering MODE statements, and then changing to the color monitor. This limitation is certainly an unfortunate oversight on the part of IBM.)

THE EASIEST way to create an AUTOEXEC.BAT file is to copy it from the keyboard.

The use of the ,T option of the MODE statement will cause a test pattern to be displayed on the screen. You will be asked to answer whether or not the first 0 is displayed on the far left side of the screen. Record the number of times you answered no to this question. This will be the number of MODE 80,R statements you will need to enter in your AUTOEXEC.BAT file. Each time the MODE 80,R statement is executed, the screen will be shifted to the right two characters.

Use of the MODE 40,R statement will shift the screen one character to the right in 40-column width, having the same net effect. When using only DOS, use of the 40 or 80 in the MODE statement will have the same effect as the setting WIDTH in BASIC. Applications programs written in BASIC may now reset WIDTH or SCREEN without having an effect upon the shifted display.

The easiest way to create an AUTOEXEC.BAT file is to copy it from the keyboard. You could accomplish this while in DOS by entering COPY CON:AUTOEXEC.BAT and hitting ENTER. On the lines below enter the appropriate number of MODE 80,R statements as required by the procedure above. Each MODE statement will have the effect of shifting the display two characters to the right each time it appears in the AUTOEXEC.BAT file. You may also want to include the DATE, TIME, or other commands in your file. If you exclude the DATE command from the file, you will not be prompted for the date when you load your DOS diskette. If a current date is not available in the system, the date will be omitted from the file directory for any new files that are created. End the keyboard entry and write the file to disk by depressing F6 (which will be displayed on the screen as ^Z) and ENTER.

Adding MODE statements to existing applications programs is somewhat more difficult. First you must determine if your applications program is utilizing the standard DOS COMMAND.COM. This may be done by checking the procedure used when you first received your applications program. If you originally copied the COMMAND.COM program from a DOS diskette onto the applications program diskette (as is the case with VisiCalc), it will be easy to add the MODE statement to the AUTOEXEC.BAT file that already exists on the program diskette. Copy the MODE.COM program from the DOS diskette to the applications program diskette. From the DOS prompt "A>", use the TYPE command and list the existing AU-

Bob Rice, a PC Tutor, is a microcomputer consultant in the Los Angeles area, who specializes in the IBM Personal Computer. He has worked as a supervising programmer for a large software developing firm.

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TOEXEC.BAT file. It should read "VC80" or "VC40." Make a note of this and create your new AUTOEXEC.BAT file. Use the procedure detailed in the first example; however, before entering F6, simply add the VC80 or VC40 command that was present in the original AUTOEXEC.BAT file.

Other applications programs utilize special COMMAND.COM programs. The standard DOS COMMAND.COM program is executed each time a new DOS diskette is loaded into memory. The COMMAND.COM function of DOS checks for the file named AUTOEXEC.BAT. If it is present, then the commands contained within that file are executed. If not, then the user is prompted for the date. Afterwards the DOS prompt is displayed. Inserting the MODE command within an AUTOEXEC.BAT file would be futile since the COMMAND.COM used by the applications program would not be looking for the AUTOEXEC.BAT file. Therefore, several more steps are required to utilize the MODE command on program diskettes such as EasyWriter I.

To determine that the DOS COMMAND.COM is not being used by the application program, check the program manual for the procedures used to build the program diskette originally. If you did not copy the COMMAND.COM program from the DOS diskette to the program diskette, then the application program is utilizing a special COMMAND.COM program. To add the MODE command to this type of program you must first rename the COMMAND.COM if present to some other name.

As with the EasyWriter I program, utilize the DOS RENAME command and rename COMMAND.COM as ESYWRTR.COM (you may use any name other than COMMAND.COM; however, the file extension should remain .COM). Then copy the COMMAND.COM and the MODE.COM from the DOS diskette to the EasyWriter diskette. The two unlisted programs that are transferred by the DOS SYS command ensure that the COMMAND.COM program is the first program to be executed upon system start up or reset.

COMMAND.COM then checks for the presence of AUTOEXEC.BAT, which is executed as I described before. Now create the AUTOEXEC.BAT file and include MODE and ESYWRTR.COM commands.

The procedures detailed above can be utilized to install any DOS commands within an AUTOEXEC.BAT file. It is extremely important that you rename the original COMMAND.COM, such as on EasyWriter, copying the new COMMAND.COM onto the proper diskette. If you don't, you will probably destroy your only back-up copy of EasyWriter (or other application program), since most of the programs are copy protected.

WELL, JACK, you're certainly not alone in having problems with the IBM Asynchronous Communications Support program.

Communicating With The Source

Q: I've recently purchased the IBM Asynchronous Communications Support program and have been unable to use it for communications with The Source. I'm getting double characters, and when I try to backspace, I get some sort of graphics symbol on the screen. What am I doing wrong?

Jack Mathias
Evansville, Indiana

A: Well, Jack, you're certainly not alone in having problems with the IBM Asynchronous Communications Support program. Aside from having to be familiar with communications protocol to use the program, an error in the program prevents you from being able to backspace properly. You can choose from over 20 different menu-selectable parameters when starting up the program, which provides a great deal of flexibility for communications with many different types of computers. For many users, however, this flexibility only increases chances of incorrect settings.

Many of the parameters set in the program as default settings are correct for use

with The Source; however, same ore not. Additionolly, The Source users' manuol colls for the selection of "NO PARITY" for use with their system. This is incorrect for the Asynchronous Communications Suppart pragram since setting "NO PARITY" will cause the program to expect eight instead of seven doto bits. This couses incoming chorocters to be displayed an the screen as graphics symbals insteod of olphonumeric choracters. Porometers thot should be chonged in the program for use with The Saurce ore os fallaws:

- Pority—Even or Odd
- Type af echoing—Host echoing
- First chorocter to be deleted—Line feed (for use with the Hayes Smortmodem)

The inobility to backspace is caused by on errar in the progrom code. Morris Thompson of Dollos, Texos has submitted three lines of cade thot correct the problem. They ore as follows:

```
• 2005 D%=512+ASC(BKS$):CALL SS
(C%.T%.D%.E%)
• 5106 IF RIGHT$(B$.1)<>BKS$ THEN 5110
• 5107 IF LEN(B$)>1 THEN B$=LEFT$
(B$.LEN(B$)-2) ELSE GOSUB 2720: GOTO 5200
```

Further modificotions hove been mode to the Asynchronous Communicotions Suppart program ond ore currently avoilable to users of The Source. Drop o line to the PC Tutor for more informotion.

On Top of the Unit

Q: I'm presently using a 17-inch Sony color television that sits on top of my system unit, and I'm planning to purchase the Sony Profeel monitor. Can I place the 19-inch Profeel atop the system unit? I would also like to knaw which expansian slot ta choose for my memory expansion board.

Frank Markus
New York, New York

A: Frank, I wauldn't place the Profeel otop the PC system unit. The IBM monochrome disploy, which is often seen otop the system unit, weighs only 17 pounds. The 19-inch Sony Profeel weighs approximotely 79 pounds. The system unit is constructed without ony support for the cabinet except oround the edges. The weight of the Profeel would ploce stroin upan the instolled system expansion boords since they are ploced so close to the top of the cabinet. Pressure on the expansion boords would have o tendency to worp the system boord and possibly couse failure of the PC.

If you ore plonning to ploce o heovy monitor obove the system unit, I suggest building a shelf of heovy plywood or onything strong enough to support the weight of the manitor—ta keep it aff the system cobinet.

IF YOU are planning to place a heavy monitor above the system unit, I suggest building a shelf.

As for choosing on expansion slot for the memory exponsion boord, be coutious about placing o long expansion boord in the slot closest to the speaker. The system units manufactured during early stages af production seem to hove hod metol brockets holding the speaker with fingerlike projections extending toword the neorest circuit boord exponsion slot. If you instoll o board without o guide mounted on the front of the chossis, the system unit could jar enough for the circuit boord ta short ogoinst the speoker brocket. Newer system units ore supplied with plostic speoker mounting brockets thot lessen the chances of this hoppening. However, I would still avoid plocing o long expansion boord in thot position. The cleoronce between the speoker ond on instolled circuit baard is minimal.

PC Tutar answers yaur questions ond solves procticol problems of generol interest. If you would like to hove your questians onswered, drop o line to PC Tutor, PC magazine, 1528 Irving St., Son Froncisco, CA 94122. If you are an The Saurce, you may send your questions directly to Bob Rice, PC Tutar, TCT335.

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PC Reviews The Smith-Corona TP-1 Printer

Here's one solution for those who simply don't want to send out documents in dot matrix print.

The Smith-Corona TP-1 fills a hole in the printer market for a reliable letter-quality printer costing less than $900.

Several years ago an executive of the company that makes the IBM PC dot matrix printer told me that corporate managers would get angry if the work they got from their subordinates didn't have little rough edges on both sides and wasn't printed in a dot matrix font. He maintained that the dot matrix printer was fast and economical and that managers would "grow to love" the print quality because of the economy. He was right about dot matrix being fast and economical, but every business person I know would rather hand write an important letter than let it go out from a dot matrix printer. Dot matrix says to me: "You aren't important enough to get a typed letter, so this is the best we can do."

For the past 4 years, because I don't want to insult my friends and business associates, I have fussed and fumed with a converted IBM Selectric printer that produces beautifully printed pages. But it also has enough springs, relays, cams, and widgets to ensure that it is out of operation about 30 days a year. Several times I almost spent nearly as much on a printer as I spent on the PC, but I always held back because I was sure some less expensive solution would be just around the corner. We just turned the corner.

The Smith-Corona TP-1 is a true daisy wheel printer, made in America, which produces documents with a high-quality print and a list price under $900. I have seen ads offering it for under $700. It comes in versions that interface with either a Centronics standard parallel port or an RS-232-C serial port.

I can hear the skeptics getting restless: "What's the catch?" They think all this is too good to be true. Honestly, the only catch is that it isn't super fast. But it prints about twice as fast as any secretary in an office can type. It prints as fast as my converted IBM and those keyboard plunger devices some people put on typewriters. Is that fast enough? Compare prices before you answer.

Let's take an inside look at the Smith-Corona TP-1 to see if it can meet your needs for letter-quality printing.

Inside the TP-1

The TP-1 is built on an aluminum chassis and has a very sturdy plastic cabinet lined with sound insulating foam. It weighs about 18 pounds. Measuring 19.5 inches wide and 12.4 inches deep, it is about 4 inches wider than the IBM PC's dot matrix printer, but still several inches below the width of most other letter-quality printers.

The logic and interface cards are placed vertically in back of the machine. A hefty transformer/rectifier power supply runs the electronics and the motors, which move the print carriage, turn the platen, position the wheel, and strike the hammer. While a lot of mechanical activity exists when the machine is printing, the number of moving parts is really very small and those that do move are easily replaced.

It is obvious that the field maintenance folks had a lot to say about the design of the TP-1. Things are easily reached, however some of the adjustments require special power supplies (for positioning) and gauges. The printer seems to be an adaptation of the well-received Ultrasonic line of Smith-Corona typewriters. This means that service and parts should be no mystery to Smith-Corona dealers across the nation.

The print carriage itself is moved by a very sturdy tooth and sprocket arrangement. I never trust those thin bands or cables I see doing this job in so many other daisy wheel machines. The printed circuit

Frank Derfler is a free-lance author who writes about microcomputers and data communications. He has written three microcomputer books for Prentice-Hall including Microcomputer Data Communications Systems.

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cards have a minimum number of plugs to vibrate loose, and those they do have are secured with clips. The circuit boards are of high quality and everything seems to run cool.

The TP-1 comes with either a serial or a parallel interface board in place. No provision is made for owners changing electrical interface schemes. The RS-232-C serial interface uses request to send (pin 4) and data terminal ready (pin 20) to control the flow from the computer. It has only a very small buffer. The baud rate, word length (7 or 8), number of stop bits, and parity settings are all determined by the placement of jumpers on the interface board. The parallel interface uses the same signaling as the IBM dot matrix printer.

Up on top, the paper bale, paper feed guide, and platen knobs all appear to be standard Smith-Corona equipment. The platen is 13 inches wide, so extra-wide paper can be used.

The ribbons and print wheels are very easy to change and are surprisingly inexpensive. The print wheels snap into place with one hand. The ribbon cartridge slides into a special holder that moves into place with the push of a single finger. The ribbon automatically moves into position between the print wheel and the paper.

Operating the TP-1

The Smith-Corona TP-1 has only two electrical controls: the power switch and the switch to set top of form. The power switch is located out of sight in the back of the machine next to the line cord. I have seen switches in this position on many devices, including some very expensive terminals and other peripherals, but I still don't like them. Placement in this position guarantees that the machine won't be turned off by a careless movement, but I hate putting my hand in the back of electrical equipment where I can't see it.

A fan turns on with the power switch. The whine of the TP-1's fan is louder and more highly pitched than the sound of the fan in the PC and therefore more annoying. I will admit, however, that you can still hear the sound of the PC's disks grinding and seeking over the sound of the TP-1 fan.

The TP-1 print mechanism operates at a moderate noise level that subjectively seems to fall between the level of the IBM dot matrix printer and that of an older IBM Selectric printer.

The print mechanism prints only when moving from left to right. It is rated at a speed of about 12 to 15 characters per second (depending on where the characters are in relationship to one another on the print wheel). I ran some tests with mixed text and recorded a throughput of about 130 words per minute. That isn't fast compared to most modern printers, but speed costs money in terms of both initial purchase and maintenance. If you want to go faster and have the print face look as good, you will have to pay a lot more money.

The top of form switch has two positions—clear and set. When the top of form is set, the printer will automatically print 58 lines and then skip 8 lines to move over the perforations on fanfold paper.

The printer manual recommends not using fanfold paper unless the optional tractor feed mechanism is installed. The tractor feed was not yet available for review, but I ran several sheets of fanfold through the machine and the top of form performed as advertised. Any pressure roller machine may have trouble pulling fanfold paper evenly, but the TP-1 can handle a few sheets if they have no tension or resistance.

Used as a word-processing printer for the IBM PC, the top of form would normally be left in the "clear" position. The word-processing program would handle line spacing, margins, and paper movement.

The print quality of the TP-1 is as good or better than any typewriter on the market. Print quality is, of course, directly affected by the type of ribbon in use, the wear on the wheel, and the adjustment of the machine, but the TP-1 looks great.

Three ribbons are available: a multistrike ribbon that sells for $4.95 and provides long wear and good quality, a multistrike mylar ribbon costing the same price (it is meant to be used with lift-off tape on manual typewriters), and a $6.95, one-time film ribbon for the print you love to read. They are all black.

You have to order the TP-1 for the pitch you want (either 10 or 12). The 10-pitch machine will print a 105-character line. The 12-pitch machine will print 126 characters on a line. If you need the extra characters for special applications, such as spreadsheets and reports, you have to be sure to order the 12-pitch machine.

Presently six print wheels are available

for the 10-pitch machines and five for the 12-pitch. They include script and other common print styles, but as of yet there is no optical character reader or speech writer fonts. Of special interest to programmers are some important programming characters that are not available on the print wheels. They will not print less than or greater than, or a caret (the up arrow meaning "to the power of"). I think a little letter-writing campaign to Smith-Corona might be in order to try and convince them of the importance of those characters to programmers.

Interfacing With the PC

There are always several levels of interface between a computer and any peripheral. The TP-1 is easy to interface electrically. The cable designed for the IBM dot matrix printer plugs right into the parallel version of the TP-1. Until the world of word-processing software for the IBM becomes a little clearer, I would suggest that the TP-1 with the parallel interface is the one to buy.

Another level of interface involves the ability of the application program to take advantage of whatever capabilities the printer can offer. The TP-1 is not elegant. It cannot do proportional spacing, subscripts, or superscripts, but it can do a very nice job of underlining if you send the right ASCII command down the line. It can overstrike and put accent marks on words.

I used the TP-1 with both MicroPro's *WordStar* (running under Digital Research's CP/M-80 operating system with XEDEX Baby Blue) and with the *Volkswriter* program from Lifetree Software. The TP-1 responds perfectly to those *WordStar* control-P commands that are within its capability: B-Bold (only an overstrike), D-Double (again, only an overstrike), S-underscore (characters only), X-strikeout, and G-character overprint. I initialized *WordStar* using the "TTY printer that can backspace" option.

If you have the memory to run it, *Volkswriter* interfaces the PC with the TP-1 very well. *Volkswriter* can automatically issue the same commands to the TP-1 as *WordStar*. You have to select the printer 1 (IBM PC dot matrix) format. Additionally, *Volkswriter* has the capability to key in any specific ASCII character through the use of the Alt key and the number pad. This means that you can take advantage of a few characters on the TP-1 print wheel that you might otherwise not reach. For instance, if the TP-1 receives a hex 15 (ASCII NAK), it will print the ¼ fraction. A hex 16 (ASCII SYN) prints ½ and a hex 17 (ASCII ETB) prints a cents sign.

Simply stated, the TP-1 is not difficult to interface to the PC. Future word-processing programs should continue to handle its modest requirements easily.

The Smith-Corona TP-1 provides a good, low-cost solution for those of us who simply don't want to send out letters and documents in dot matrix print. It is an American-made product that fills a need in the market and provides good value. I predict the 3,000 people employed by Smith-Corona in Cortland, New York are going to be busy. */PC*

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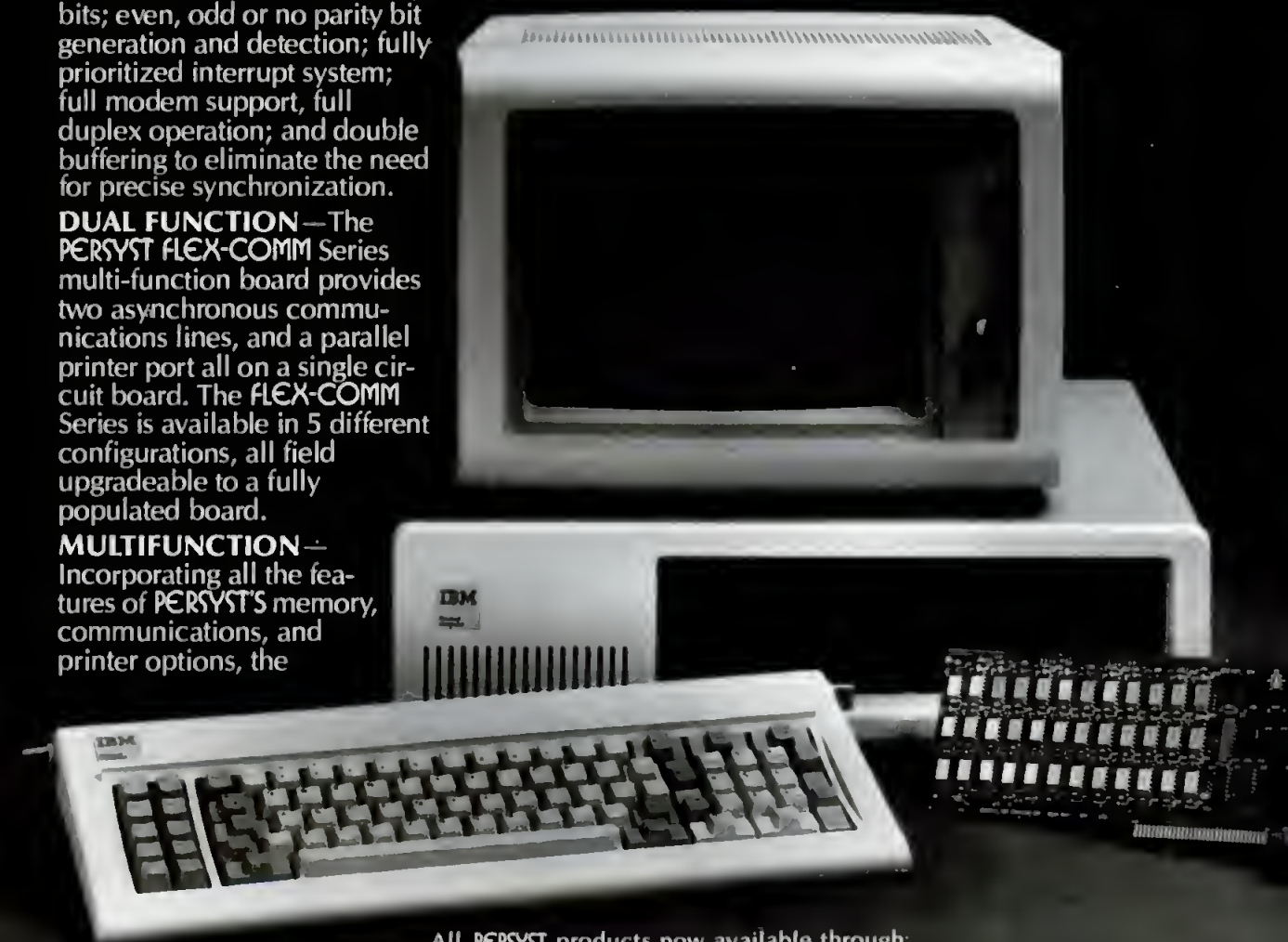

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PC Takes A Look At IBM's Pascal Compiler

An alternative to BASIC and assembly language.

I began my investigation of IBM's Pascal Compiler by reading the manual for an hour or so. The preface states that in addition to handling standard Pascal, there are many extensions to the language, separate compilation, new data types, direct input/output (I/O), etc., so that it may be used for writing systems programs like compilers and operating systems. Rapid execution and minimal memory requirements are also among its capabilities. That all sounded terrific—a software developer's dream—so I read on.

Reading on posed the first problem: The manual is poorly written. It must have been intended as a reference document, since it has little or no tutorial value. I suspect the author assumed that the user either already knew Pascal or would use a textbook. That would be a passable solution for the standard language, but what about trying to learn the extensions and operating procedures? Even as a reference manual, it rates low. It has very few examples and the treatment is uneven. Compared to the BASIC manual, which also came from Microsoft, this manual looks bad. The problem might be those snappy little boxes in which all the IBM manuals come; a topic as complex as this compiler just can't be covered in such a small document.

THE PROGRAM is 306 lines long and is broken into ten procedures.

Using the Compiler

After perusing the manual, I tried the compiler out. I compiled three programs to

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It's not just a matter of memory—Forty questions you should ask yourself before you take the hard disk dive.

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Which operating systems (PC DOS, CP/M-86, UCSD P-System, Qunix, etc.) are available?

What, if anything, is the charge for additional operating systems?

What is the policy with regard to operating system upgrades? Will later versions be supplied at a nominal charge?

Can the disk be partitioned into several sections, each running a different operating system?

Might you want to grow into a local network someday? If so, Corvus is presently the only vendor.

What are the dimensions of the disk subsystem? How much desk space will it occupy?

How noisy is it? Size and noise may be particular problems if it uses 8-inch drives rather than 5-inch drives.

If it fits inside the PC chassis, how is it on power consumption? How about heat dissipation?

What media will you use for backup?

Is a backup utility program included in the system? Can it save a large file on several floppy disks? Can it automatically archive files that have been changed since the last backup or since a certain date?

Is one floppy disk drive enough for you? Will you be copying floppy disks frequently? Will you occasionally use software that requires more than one drive and runs under a different operating system from the one used on your hard disk?

How are the logical drives on the hard disk addressed? How many may there be? May drive A be on the hard disk?

How fast is the subsystem? If possible, run some benchmarks, since I have heard of two- or three-to-one differences.

How complete is the documentation? How difficult is it to bring the disks up?

How long is the warranty period and where is service performed? Is a maintenance contract available?

Are there diagnostic programs available? Does the operating system log errors?

Is there an editing utility for directly examining and modifying the disk?

Is it possible to upgrade the system to extend disk capacity? Is this done by changing drives or adding drives?

Do you need extra expansion slots? If so, the Tecmar hard disk has six extra ones.

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What is the buffer size, if any, on the controller?

Does the controller have any built-in facility for error detection and correction?

—*Lorry Press*

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get a feel for the operation of the compiler and the quality of the object programs it produces. The first was a null program, just a BEGIN and an END, which gives us a lower limit on compile time and storage requirements. The second was the prime number program tested on many personal computers in the September 1981 issue of *BYTE* magazine and April-May 1982 issue of *PC*. Finally, I tried the compiler out on a "typical" data-processing program. The program is 306 lines long and is broken into ten procedures. It reads and writes disk files, processes data in several arrays of records, and uses many of the string handling extensions that IBM has made to the Pascal language. The following table summarizes my experiments with these programs:

BY NOW you should be convinced that a hard disk would be a worthwhile investment.

Program	Compile Time	Object Size	Execution Time
Null	2m 45s	18,688	—
Prime No.	3m 23s	32,768	1m 16s
Typical DP	7m 22s	57,600	—

To compile a program you must use three different system disks: two compiler passes and a loader. The measurement of compile times included swapping diskettes, but since a batch file was used, this didn't add much to the overall time. If I were going to do any serious software development with this compiler, I would get a hard disk to speed up compiler execution and to avoid having to swap diskettes between passes.

A hard disk would also help with another operational problem that doesn't show up in the table. Since the intermediate files produced by the first and second passes of the compiler are quite large, it was not possible to compile the 306-line data-processing program if it was on a diskette that also contained a copy of the operating system; the compiler would run out of disk space. To make matters worse, if your program has any syntax errors that are caught in pass one of the compiler, some disk space "disappears" and can be recovered only by running the CHKDSK utility program. By now you should be convinced that a hard disk would be a worthwhile investment for software development, but how about the efficiency of the finished product?

Compare the Compilers

For purposes of comparison, the following table shows the results obtained for the prime number program on a Z-80 using three other Pascal compilers:

Compiler	Compile Time	Object Size	Execution Time
Pascal MT+	1m 42s	3,043	19s
Pascal Z	2m 4s	3,328	1m 49s
Pascal M	50s	21,933	7m 30s

IBM Pascal programs are not small; even the null program requires 18,688 bytes. I also had a chance to use a relatively simple word-processing editor that was written using this Pascal, and I was surprised to see that it required about 55K bytes, which was more than I would have expected. Not only does the compiler produce large programs, but the word "overlay" is not to be found in the index to the manual. Program code and data segment sizes are restricted to 64K bytes using this compiler. Even though I expect that the typical PC configuration will turn out to have at least 320K bytes of memory, this compiler seems to use too much of it.

Execution speeds for the prime number programs are also shown. I have seen other benchmarks of Pascal MT+, and it is consistently fast. This one simple experiment doesn't shed all that much light on execution times, however. The data-processing program is not useful as a benchmark for execution time because it is I/O bound.

This compiler is not for beginners because the documentation is lacking. It extends standard Pascal so that it may be used as a systems programming language. The power of these extensions is illustrated by the fact that both this and the IBM FORTRAN compiler were written in Pascal. On the other hand, serious software development efforts will require a hard disk and will produce large programs. ***/PC***

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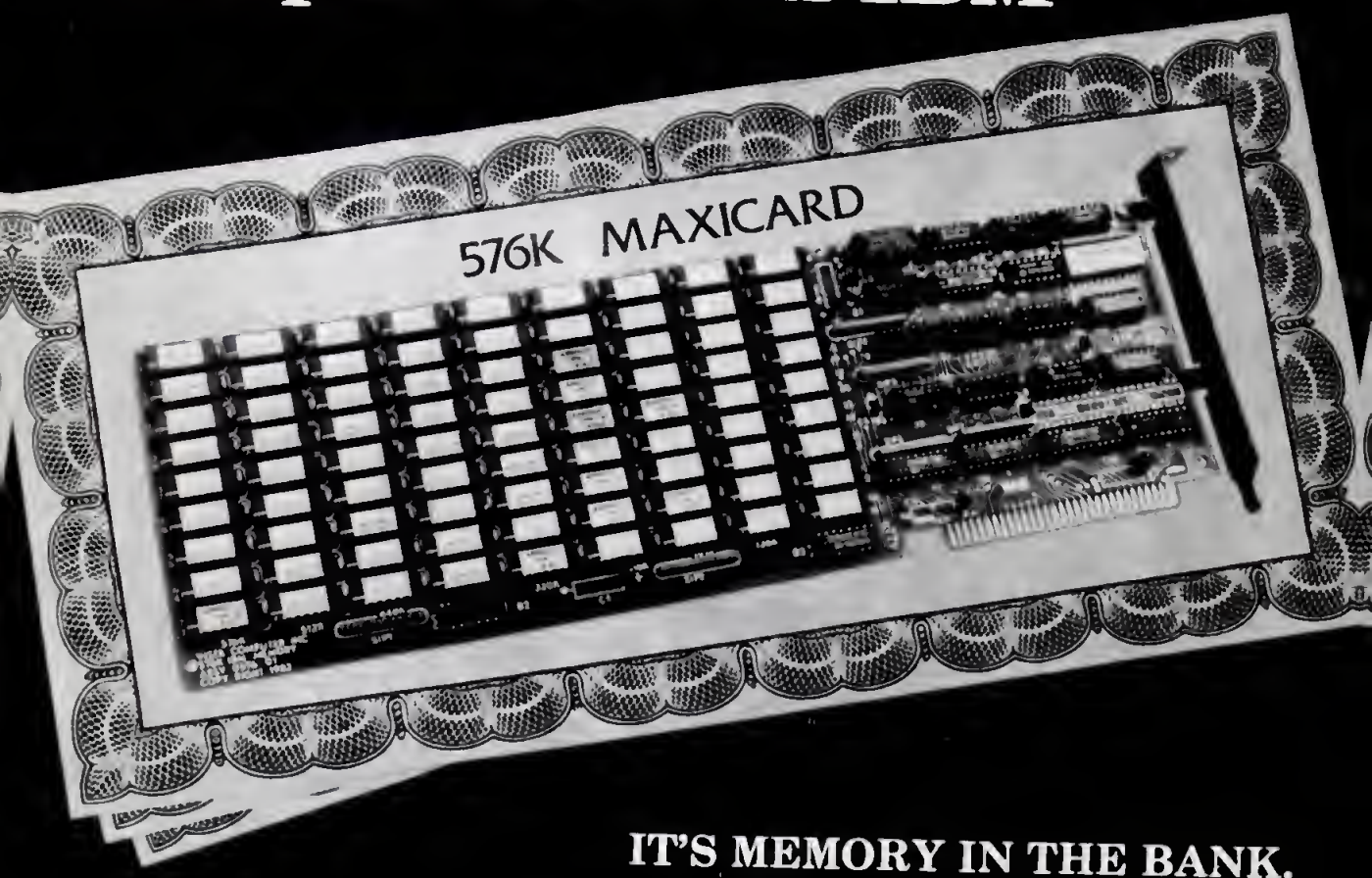

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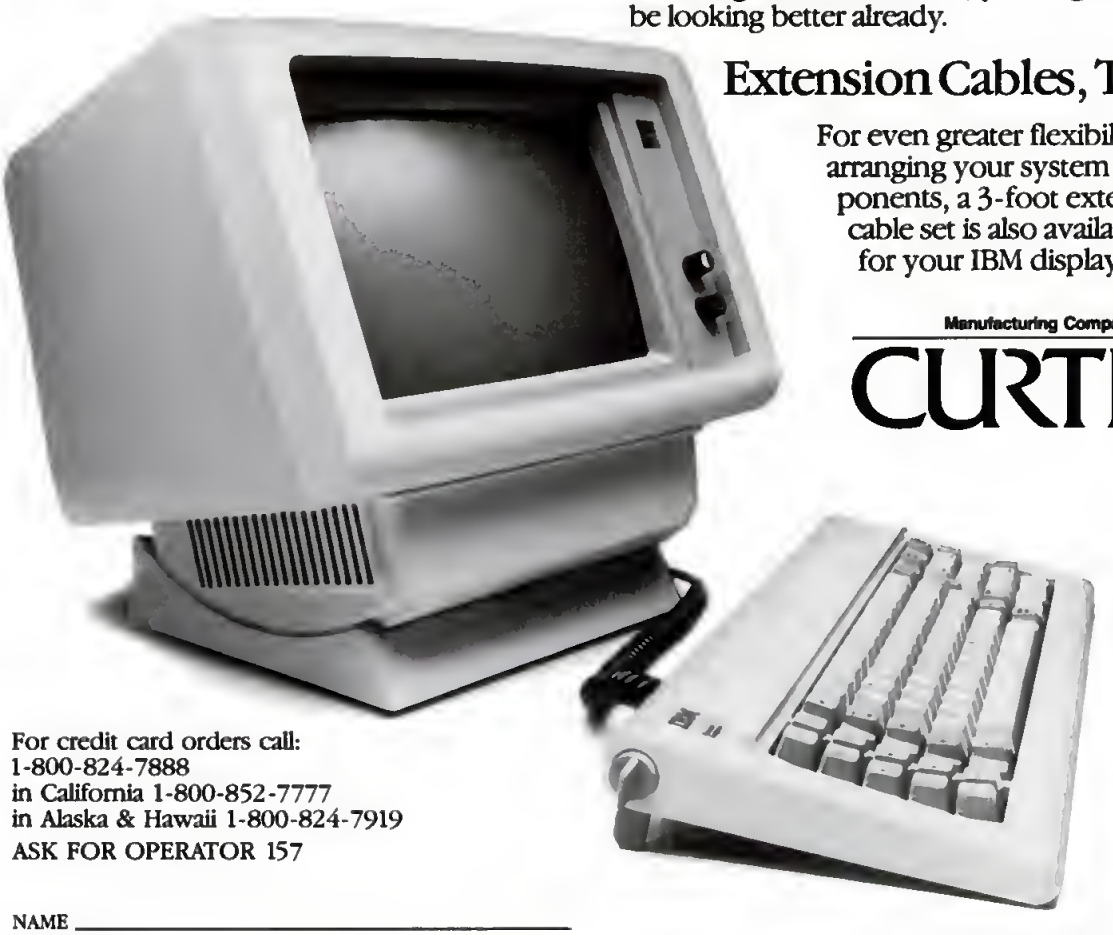

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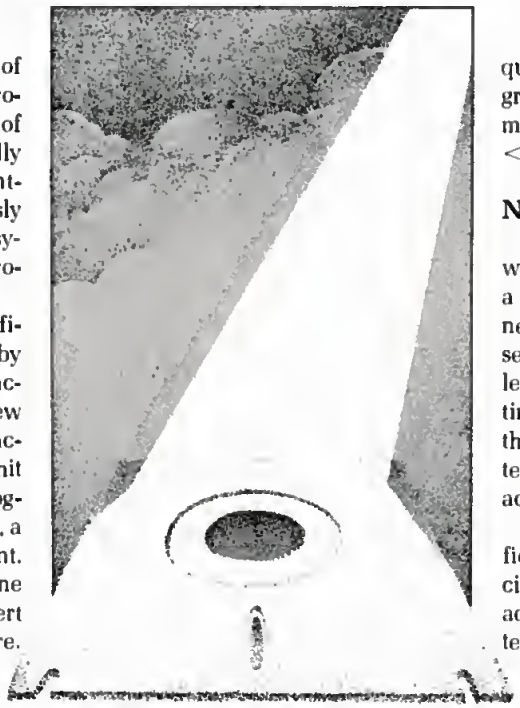
PCM-4

EasyWriter Resurrected

This simplified, easy-to-use and practical version is quite an improvement, especially the Insert and Delete functions.

IBM has released a new version 1.10 of EosyWriter, its word-processing program that has received a good deal of criticism in these pages and generally among the PC user community. Apparently IBM has taken all the criticism seriously and is committed to establishing EosyWriter as a respectable, useful word-processor for the PC.

The program's performance has definitely been improved, most noticeably by speeding up the Insert and Delete functions. In contrast to version 1.00, the new version lets you insert and delete characters and words twice as fast as you can hit the keys. The INS key now works as a toggle to turn the Insert function on and off, a feature that is logical and convenient. Pressing the <F3> key to insert a line now automatically places you in Insert mode, so the "Insert Phantom" is no more.



Improvements

The cursor appears thinner in the new version. With the monochrome display, it's now a sliver one-scan-line thick and a bit difficult to spot in a full screen of text. During editing sessions, you might prefer to stay in Insert mode, which displays the cursor as a blinking solid block.

The command structure has been streamlined. The <F4> key now operates as a toggle for the Additional Commands Menu, and you can access the Additional Commands directly from the File System Menu. More information is presented on the menus, and the configuration routines for setting program defaults (indentation, tabs, and margins) and printer installation have been conveniently moved to separate routines supplied with the program.

The program works well with both the 5530 Spinwriter and the IBM printer, the only ones tested for this review. The Imbedded print commands no longer cause extra line feeds as they did in the first version, so formatting of printed documents now works predictably and smoothly.

Another of the version 1.00 bugaboos was the Block Move/Copy routine. Greatly simplified, it now requires only five steps: insert first block marker with <F8>; insert second block marker with <F8>; delete block with Ctrl-C; move cursor to new location; insert block with Ctrl-G. Blocks can be identified and moved in the middle of lines. The whole Move/Copy system works very efficiently, the only snag being some delay if the block exists near the end of a long file. (See the discussion of file size below.)

The Alignment routine has been speeded up slightly by not displaying the text during alignment, although it does produce noticeable delays. Since aligning still operates from the cursor position all the way to the end of the file, realigning frequently after minor text revisions is not very practical. A test produced no "black holes" during alignment or at any other point in the program.

(Keyboard commands are buffered, so you can enter several commands in sequence as a routine. To align the paragraph you've just written and return for more writing, you can hit "<F4>-A-<F4>-<End>" in rapid succession.)

Not a Speed Demon

The Search and Replace function also works as you'd expect, although it requires a few more commands than absolutely necessary and is not a speed demon. The search string can be up to 50 characters in length (upper- and lowercase letters distinguished), and it doesn't matter whether the search string spans several lines of text. Searches can also be conducted across multiple files if they are linked.

The margin settings have been simplified slightly, and the program will efficiently handle lines of text up to 255 characters in length. Scrolling screenfuls of text, even with 65-character line lengths, is still a bit slow (about 3 seconds per scroll).

All these additions and patches to version 1.00 have taken their toll in terms of working file size. The new version will permit files to be a maximum of 14,000 characters with a 64K machine and 24,000 characters in length if your system has 92K or more of memory. As with version 1.00, the limited file size can be compensated for by linking several files during printing.

A major improvement over version 1.00 is that all text files are now stored in DOS form and can be displayed, copied, and renamed with the DOS utilities. Actually, the EosyWriter text files are not quite standard; each file created by the program is preceded hy a 128-byte header containing the file size and information on the margins and tabs set for that file. EasyWriter text files also use a special character to mark line endings. All files created by the program are assigned an extension ".EWF" that is tacked on to the eight characters permitted for the main file name.

The new version comes supplied with a utility that will convert files created with

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version 1.00 into the new version's file format. The new program also comes with several transfer utilities that will convert other DOS files into the EWF format, and vice versa. The program can therefore function as an editor for DOS files, BASIC, or Pascal programs (provided they do not exceed the *EosyWriter* file-size limitation).

(Technical notes: The EWF files contain a null character—ASCII 00—to mark the end of every word-wrapped line and a carriage return—ASCII Hex 0D (decimal 13)—plus a null to mark each paragraph end. The transfer utilities present two options. One converts an EWF file into an "ASCII file," which converts each null character (i.e., each line end marker) into a line feed—ASCII Hex 0A (decimal 10). The other option is to convert to a "communications file," which converts every null into a carriage return. A useful conversion would be one that placed both a carriage return and a line feed combination—ASCII Hex 0D 0A—at the end of every word-wrapped line, which would seem to be the "true" DOS format for a text file. This utility was not provided in our review version.)

IT'S EXACTLY the sort of simple, inexpensive, utilitarian word-processor that IBM originally intended for the PC.

Better Than Ever

What most users really want to know, of course, is whether the resurrected *EasyWriter* is a good program. I'm delighted to report that it is. *EosyWriter 1.10* performs smoothly, will handle most any routine writing and printing job, and is easy to learn and operate. It's exactly the sort of simple, inexpensive, utilitarian word-processor that IBM originally intended for the PC. Had this been the version originally released, it would have undoubtedly satisfied most users, and *EasyWriter* would be the "standard" word-processor for the PC.

The PC community has by now had a chance to taste other fruits, and some may prove sweeter and more nutritious. *Volkswriter* from Lifetree Software provides fewer embellishments but is more elegantly designed and performs significantly faster. *WordStor*, from MicroPro International, costs more and is more complex to use but offers many more functions and options. Even Information Unlimited Software, the creators of *EosyWriter*, have released a totally different program called *EosyWriter II*, which they are promoting as a more "professional" word-processor.

For many people with average writing requirements, however, *EosyWriter 1.10* will be a very serviceable and practical program.

If you are one of the many people who purchased *EasyWriter 1.00*, you can get a free copy of version 1.10 by bringing the blue, loose-leaf cover page of your old manual to your local PC dealer. I recommend you do so. Try out the new version before you consider purchasing a replacement word-processor. If you are new to the PC and are thinking of buying a word-processor, give *EosyWriter 1.10* serious consideration. ***/PC***

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6	BREAKEVN	Breakeven analysis
7	DEPRSL	Straightline depreciation
8	DEPRSY	Sum of the digits depreciation
9	DEPRDB	Declining balance depreciation
10	DEPRDDB	Double declining balance depreciation
11	TAXDEP	Cash flow vs. depreciation tables
12	CHECK2	Prints NEBS checks along with daily register
13	CHECKBK1	Checkbook maintenance program
14	MORTGAGE/A	Mortgage amortization table
15	MULTMON	Computes time needed for money to double, triple, etc.
16	SALVAGE	Determines salvage value of an investment
17	RRVARIN	Rate of return on investment with variable inflows
18	RRCONST	Rate of return on investment with constant inflows
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20	FVAL	Future value of an investment (compound interest)
21	PVAL	Present value of a future amount
22	LOANPAY	Amount of payment on a loan
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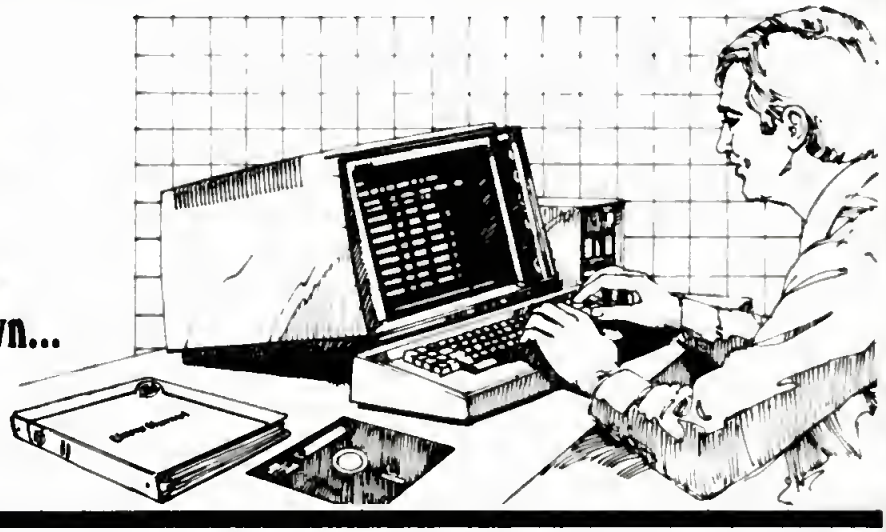

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New Software Submission Guidelines from IBM

Here are the highlights of IBM's new Software Submission Plan for the PC.

With its new personal computer IBM has also introduced a naw software policy. For the first tima the leading force in computer manufactura is welcoming softwara from independent programmers. The programmer answers questions on a six-page Submission Agreement; if IBM likes the answers, it will invite the programmer to submit code and documentation for further evaluation. If these meet IBM's approval, the programmar will be offared a contract.

If the programmer is an IBM employea, IBM will offer to buy his or her copyright rights. If not, IBM will buy a licanse to copy and distribute the program in return for royalties. The agreement with nonemployees is nonexclusive, leaving the programmer free to strika parallel agreements with other distributors. IBM's standards are demanding, however, and to maka those standards known to prospective programmers, it has published a 40-paga booklet outlining the antire submission process, also offaring several useful hints for developing both software and accompanying documantation.

Accepted or Rejected

Judging by both the content and tone of the booklet, it will take a truly superior product to meet IBM's standards. IBM seems uninterested in clichés with a new twist, nor will it offer any more consideration to the submittar than any othar publishing house. Rejection slips will come as a matter of course, and the booklet makes a point of saying that reasons for rejection will not be discussed, nor will methods of evaluation. The booklet also points out that submissions will not be returned, so don't forget to make those backups.

The Submission Plan is designed under the same format as all PC manuals, with plenty of white space, and frequent headings and "tabbed" section titles.

The inside front cover has a flap that holds two copies of the above-mentioned six-page Submission Agreament. The agreement covers 16 specific questions about the proposed software. The point of these questions is to allow IBM to tell if the product is marketable. Questions inquire about the intended users of a program, its major functions, and whether it comes with files or data bases (an "if yes, describe" question). The questions are straightforward and analytical. On some later questions, however, the programmer might do well to practice a little salesmanship. Question 7, for example, asks, "What makes your program unique?" One question seeks to discover the programmer's qualifications, and one or two are market research oriented, such as, "What products currently offered will ba potentially competitive with your program?"

Besides these numbered questions, tha agreement also asks for other information about accompanying documentation, if applicable. Most importantly, the agreement spells out IBM's position regarding its legal responsibilities toward submitted programs, and these sections should be understood before the agreement is submitted. Sending IBM a completed copy of this agreement waives certain legal protections. IBM does not want any coda or documentation accompanying the agreement but invites submission of same upon approval of the agreemant.

Six Traits

This is where the booklet itself comes in. The first section, entitled "Plan," explains tha procedure discussed above and provides other information concerning how long tha approval procass takes; what kind of advertising IBM might give a product; criteria for evaluation, such as ease of installation, "user-friendliness," reliability, error handling, marketability, etc.; how royalties and advances are calculatad; what maintenance and other support will be axpected from the programmar; and so on. This section gives six major traits that IBM is looking for. Submitted softwara should be "easy to use, offer a bettar way to accomplish a task, be entartaining or challenging, provide something special and unique, use the PC in new, useful, and

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interesting ways, and improve the PC's performance or function."

Guidelines

The second part, entitled "Guidelines," is divided into three parts. The first deals at some length with what IBM looks for in a program. To some extent these are elaborations of the criteria for evaluation, but they are also good rules of thumb for any software development. Suggestions include the following: Adhere to solid structured programming design, tast a program thoroughly before submitting it, display your copyright notice in the appropri-

IF THE programmer is an IBM employee, IBM will offer to buy his or her copyright rights.

ate places, design user prompts to be clear and consistent, and list suggestions for effective screen displays. Other Guidaline sections provide hints that are PC specific in regard to memory allocation, use of DOS routines, and selection of color combinations.

Tha second part of the Guidelines section is two brief paragraphs noting the importance of specifying hardware configurations required by the program and, better yet, making the program usable on as wide a range of configurations as possibla.

Documentation and Style

The third part covers documentation and is the neatest little essay on writing style you are likely to find in the computer world, a sort of Strunk and Whita for user manuals. It gives a general table of contents for user manuals, a hint or two on formatting, and best of all, a quick but vary useful primer on simple, good writing: Avoid the passive voice, use a convarsational tone, employ simple words and language everyone can undarstand. These are easy rules of writing, which, like the simple rules of structured and amply commented programming, are so often neglected. */PC*

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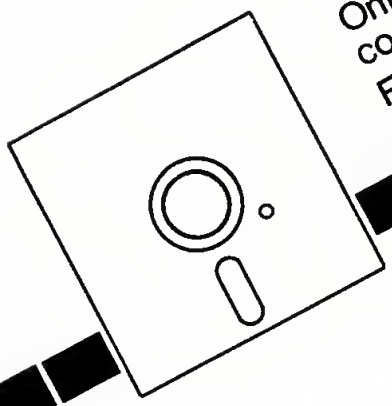

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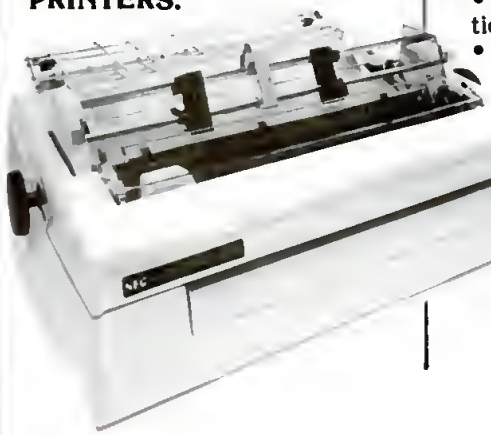

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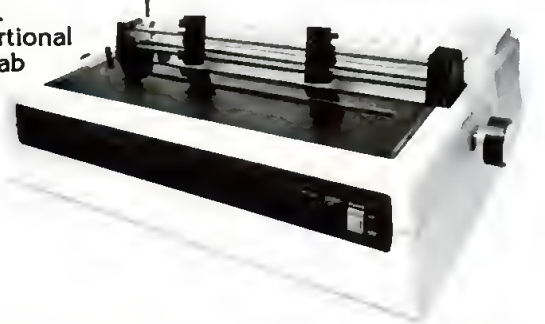

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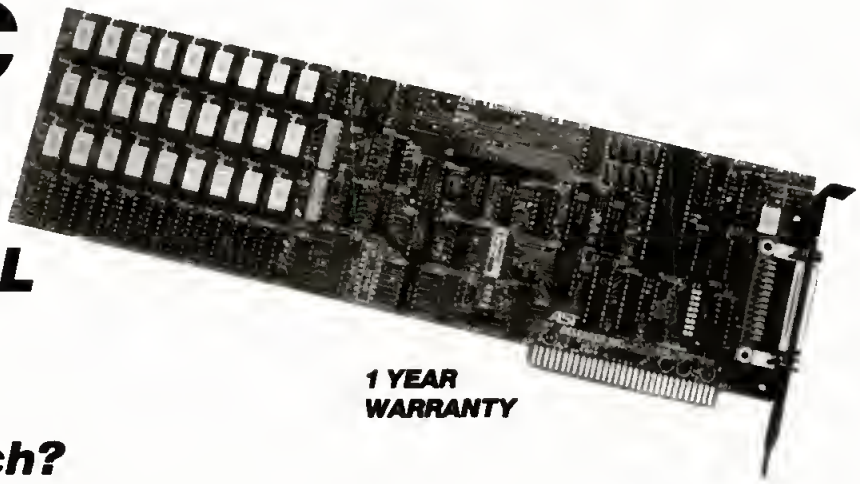

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IBM DfDN'T MAKE IT SIMPLE

Well that's good, because simple usually means limitations, and so far we have not found a lot of limitations. It is herd to pick IBM cards when you have only five slots. Now iets see. If you went graphics and color you buy one board. And if you want a printer port you buy another. Or you buy a monitor adapter and you get a printer port on the same board. When you want to add serial communication it's another board. Add some memory at 64k per board. Wait a minute. Thats two plus one, plus one, pius one more, minus one if you don't want graphics — HELP!! Your PC is now a mass of boards and you still want to do more. Not only thet, but you now have spent so much money on boards you may have to compromise somewhere else in your system.

A QUICK SURVEY

We decided the enswer was a board that could do several jobs and use a single slot. First we celled IBM to find out whet kinds of boerds and accessories ere sold in what percentages. Wrong question. You would have thought we hed asked what was on the missing 18 minutes of the Watergate tapes, because that's what we got — a iong silent pause. The official answer was "that information is not available to non-IBM people." So we started calling dealers and asking them. Turns out that about 85% of the systems they sell heve the monitor board with the printer port. The next most popular item is the asynchronous serial board, and then memory. Almost all of the salesmen we talked to tried to tell us we didn't want IBM 64k memory boards, and they would be happy to sell any number of aftermarket boards for prices ranging from $795 to $1195. A.C. Nielsen would be proud.

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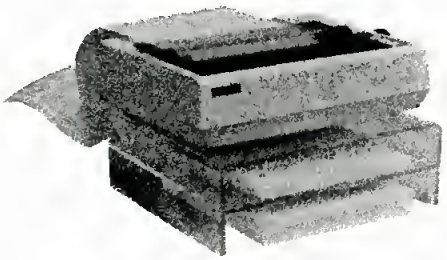

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righted material

The Computer Workstead

(Goodbye to commuter traffic, time clocks, and coffee fiends).
A view of the pleasures and particulars of a computer-at-home livelihood.

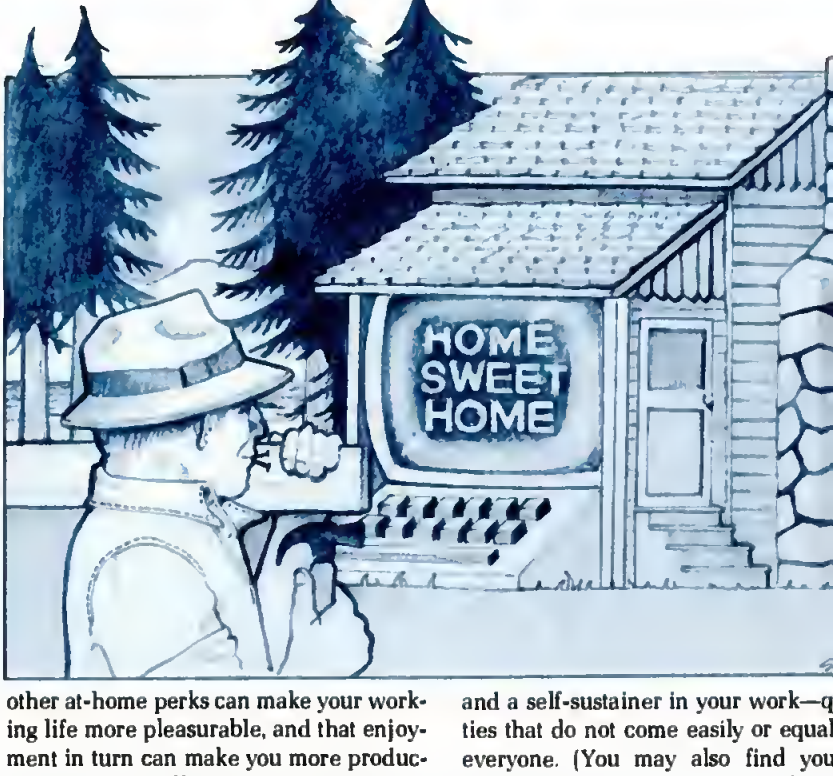

Illustration: Suzanne Anderson

As the word implies, a workstead is like a homestead—a place where work and living are combined. Worksteads are distinct from homesteads in that one's total subsistence need not derive from the home business, but the inspiration for both is the same—it just seems natural to work where you live. At least 5 million people have established worksteads in the United States, and that number is likely to double during this decade.

Up to now, most worksteads have been devoted to rather traditional at-home occupations—crafts, painting, sculpture, writing, and small-scale business services such as typing or accounting. But computers are changing all that: Now that compact, affordable, powerful micros like the PC are readily available, the computer workstead has come into its own.

The old-style typing service now offers the on-demand editing, printing, and text storage of word-processing; the solo accountant analyses a business plan or figures someone's taxes ten different ways in 10 minutes with an electronic spreadsheet program; and the programmer simply stays home to work. More important, perhaps, and certainly more promising in the long run, computer networking has vastly expanded the number of office jobs that can be done at home. For a great many of us, telecommuting will replace most of our vehicle commuting in the coming years.

The Good, the Bad, and the Two-Headed Monster

The advantages of worksteading go beyond saving transportation costs and avoiding noxious fumes, however. Obviously you can spend more time with your family, take a break whenever you want, and save the time, expense, and trouble of getting dressed up to go to work. These and other at-home perks can make your working life more pleasurable, and that enjoyment in turn can make you more productive and more effective in your career.

As in any job, the working conditions are intimately involved with every worker's performance and attitude. If you are relaxed and work in comfortable surroundings, you're likely to feel good about the work you've chosen or been assigned. If you have the safety valve of a walk around the block or a hot cup of homemade soup, you may not feel the pressure of deadlines as strongly as if you were in an office where the people and the energy level are often frantic.

Still, the good stuff can get out of hand in a workstead. You may be tempted to take the work too casually, eventually letting the breaks and interruptions outnumber the work hours. To be successful at worksteading, you must be a self-starter and a self-sustainer in your work—q ties that do not come easily or equal everyone. (You may also find you making the short jaunt to the refrige too often, at a certain peril to both work time and your waistline.)

Establishing a workstead busines quires a balance of the casual, conte attitude and the drive to make things pen. The elements of this balance are vidual for each person and situation they will become obvious during planning for a home business or very in your workstead career. The sugges that follow are intended to help you that ideal combination of factors thriving computer workstead.

A computer workstead differs most other home businesses in yet an way. The computer is almost like an ployee or a family member—it requi special environment to function reli

d occasionally it must be catered to or ddled. The factors to consider in estab- hing a computer workstead can be di- ted into two categories (or perhaps li- ned to a two-headed monster): the nputer's turf and everything else about home-based business.

he Territorial Imperative

At the risk of overstating the need to e your computer special consideration, essential that you carve out a specific ritory for the machine and make iron- d rules for its use. If you're already us- a computer in your work or making a cro the entire business of your liveli- od, you know how dependent you can come on its trouble-free operation. nd how a defunct disk drive or a splat- ed sector can ruin your day.) So a strict ands-off" policy, at least during working urs, can help to prevent such potential gedies as someone's turning off the ma- ine (or the light switch that supplies its wer) when you're out of the room or ening the shade that keeps the sun from lting your disks.

An equally important part of the "terri- rial imperative" for an electronic work- ead is establishing and maintaining a ean and well-organized computer room. hile the computer can manipulate asses of information and sort or subdi- de data with lightning speed, you have e basic responsibility for organizing the oducts of all that computing—the disks, intouts, and miscellaneous files. This eans developing a consistent and recog- zable system of naming files, labeling sks accurately and updating those labels gularly, establishing routines for saving ork to the disk several times during each our, making back-up copies of each day's es, and putting disks away in their paper eeves and inside some other protective ox or jacket.

For the most trouble-free operation of e computer and peripherals, you should eep the computer room as free of dust nd smoke as possible and refrain from ating or drinking anything in the immedi- e vicinity of the equipment. Similarly, o much heat or cold in the computer om can cause the electronic circuits or e disks to behave strangely. The best recautions for controlling temperature in e computer's environment are to follow e care instructions in your equipment manuals and on the disk sleeves and to keep both disks and machines out of direct sunlight.

Another important element of the computer room is its interior design, which usually involves planning and experimentation to find the optimal arrangement of components. The first consideration in designing this environment is placing all the equipment within reach of the outlets to which it is plugged while keeping the cords and cables out of the right of way. To complicate this component-arranging task, you want to be able to reach the keyboard easily, have the screen at a comfortable distance and angle, and put the printer far enough away so that it doesn't drown out your thoughts or conversations. (No matter where you locate this rather noisy appliance, you'll probably have to interrupt printing during conferences or phone calls.)

IT requires a special environment to function reliably, and occasionally must be catered to or coddled.

Electrical Ebb and Flow

The cords and cables that connect the various parts of a computer system generally are the most limiting factor in the design of a workstead office. Although you can't lengthen these connectors easily (because the electrical signals they carry will travel only short distances without some loss of velocity or strength, or simply because long, custom-made cables are expensive), you can give yourself some design flexibility by using a power strip to hold the plugs for the components. A power strip is a relatively inexpensive device that contains several outlets and itself plugs into the wall outlet; it also may have a circuit breaker that will automatically interrupt power in case of an electrical overload. (If you use a modem, you can add to the options for its placement by using a long telephone cord to connect it to the phone outlet; even a 25-foot cord will not diminish its signals.)

You should also protect the power supply to your computer system, particularly if your workstead is located in an older home or apartment building. The electricity in residential areas can fluctuate at times, potentially causing harm to your components or garbling some of your work. To prevent such damage, you may wish to install a surge protector or line filter, either of which you can purchase at an electrical supply store. Check with your computer dealer or technician to determine what type of gadget you need.

Whether or not you add extra protection to the power supply, the wall outlet to which your components are plugged should be grounded. If the outlet doesn't take the three-pronged plugs used in all computer equipment (and in power strips), you can use an inexpensive plug adapter and make certain that it is grounded by attaching its ground wire to a metal conduit that leads to the ground, such as a cold water pipe. You can purchase a simple tester that will confirm whether an outlet is properly grounded, and if you have questions or continuing problems with the power supply, consult an electrician.

The Cardinal Rules

Once the computer room is designed and the power supply is protected, you can turn your attention to the other part of our two-headed monster—the basic considerations for starting any workstead business. Although these five "cardinal rules" are less specific than a no-smoking or hands-off policy in your office, they are crucial to the success and longevity of a working and living combination. You may have already anticipated some of these issues, but it can't hurt to think them through again and to discuss them with everyone who will be part of your workstead career.

The first rule is to choose work that you enjoy. This is the most obvious consideration for any workstead, but it is also disregarded surprisingly often. Remember that you will be living with your work 24 hours a day, 7 days a week, and if you don't especially like your occupation, this attitude will affect both your work and your leisure, because both are usually concentrated in the same place. If you aren't sure whether a computer career or a home

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If you enjoy the home career that you've chosen, the second rule should be easy to follow: Have confidence that you will succeed in this workstead business. Though it sounds all too familiar, believing that you can accomplish your objectives is a critical part of beginning any business venture. One possible danger of working in the casual atmosphere of home may be that you don't have quite the same motivation to survive and succeed as if you were renting an office somewhere else; the economic pressure may be less severe, and so you may be tempted to take the venture less seriously. Confidence is an effective antidote for this condition; if you are absolutely convinced that your business will thrive, motivation is not likely to be a problem.

The third cardinal rule for worksteading is probably the most difficult to follow. This is self-discipline, an attribute that few of us have enough of and a skill that must be tended constantly. When you're in a comfortable home office, in the surroundings that you've designed, it's all too easy to notice that the plants need watering, the dog needs walking, or the laundry really shouldn't wait another day.

In most worksteads, too, no one is there to ride herd on you, so you must map the boundaries of your workday and make yourself stick to the routines you've established. In this connection, you may have to fool yourself, perhaps by pretending that you are going to an away-from-home office like everybody else, setting some regular time to be at your desk each morning, and limiting yourself to no more than three trips to the refrigerator during the day.

When you have grappled with self-discipline, you're ready for the fourth proviso: Establish ground rules about your work-at-home career for everyone else in your life. Many people tend to take worksteaders less seriously than other working people, so you probably will have to be emphatic in reminding certain friends or family members that you are making a living—not goofing off. You'll be most successful at achieving an understanding with your family and friends about the times you shouldn't be disturbed and the times you are available if you establish clear guidelines and follow them yourself.

Finally, you must build some safety valves into your workstead career. You will need regular breaks from the concentration of work, and these can be timed to coordinate with family or friends, such as greeting the children after school or going outside to talk with a neighbor. Because isolation is one of the common problems of home business people, you should plan to meet with friends and professional colleagues regularly—away from your home at least some of the time. Even the most contented worksteaders should have a change of scene every day.

Another aspect of working at home that requires safety-valve measures is the potential for an almost endless workday. When the office is just a few steps away, it's easy to go back to your desk and especially to your beckoning computer if you haven't made plans that include some leisure activities to balance the working hours of each day. Certainly there will be times when a job deadline or a compelling project will keep you at your desk for more than 8 hours a day, but this cannot become a habit without jeopardizing both your health and your professional competence.

In short, your own interior design is just as important a consideration for a computer workstead as the architecture of your office or the smooth flow of electricity to all the circuits. If you can find the right plugs and cords, keep the computer room clean and cool, believe in yourself and stick to your schedule, as well as get your friends to respect your work time and to make certain that you get away from work often, you'll have conquered the two-headed monster. And you are very likely to have a good time doing it, for staying home to work can be among the richest and most rewarding careers anyone could wish. /PC

Jeremy Joon Hewes is on associate editor of PC and author of Worksteads: Living and Working in the Same Place (Doubleday, 1981), which she wrote before she had a computer, and co-author of Writing in the Computer Age (Doubleday), to be published in October 1982.

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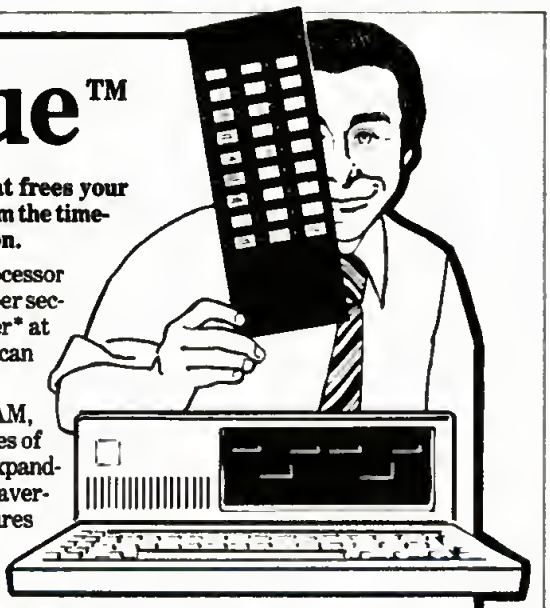

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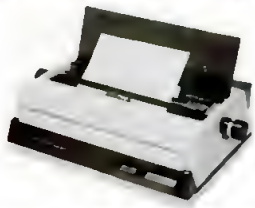

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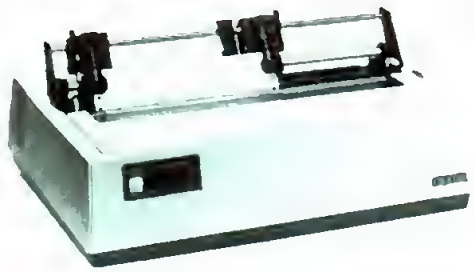

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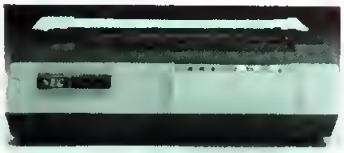

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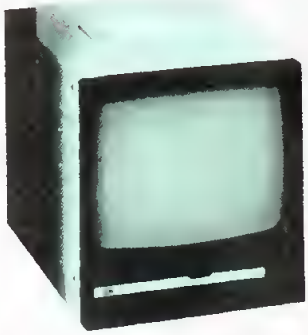

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>A 8:"INT'L TEL
>A 9:"BALLY
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>B 5:"TICKER
>B 6:"SYMBOL
>B 8:"  ITT
>B 9:"  BLY
>B10:"  BX
>B11:"  MCO
>B13:"TOTALS

>C 1:"STOCK POR
>C 5:"NUMBER OF
>C 6:"SHARES
>C 8:1000
>C 9:1500
>C10:2000
>C11:1000
>C12:/--
>C13:@SUM(C8...C12)

>D 1:"TFOLIO
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>D 8:34.5
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>E 9:23.125
>E10:66.5
>E11:61.13

>F 5:/FR"GAIN/
>F 6:/FR"LOSS
>F 8:(C8*E8)-(C8*D8)
>F 9:(C9*E9)-(C9*D9)
>F10:(C10*E10)-(C10*D10)
>F11:(C11*E11)-(C11*D11)
>F12:/--
>F13:@SUM(F8...F12)

>G 5:/FR"DIV PER
>G 6:/FR"SHARE
>G 8:.22
>G 9:.3
>G10:.88
>G11:.99

>H 5:/FR"YIELD
>H 8:(G8/E8)*100
>H 9:(G9/E9)*100
>H10:(G10/E10)*100
>H11:(G11/E11)*100
>H12:/--
>H13:@SUM(H8...H12)

/GC9
/GF$
/GOC
/GRA
/W1
```

Model Run

STOCK PORTFOLIO

NAME OF STOCK	TICKER SYMBOL	NUMBER OF SHARES	PURCH PRICE	CURR PRICE	GAIN/ LOSS	DIV PER SHARE	YIELD
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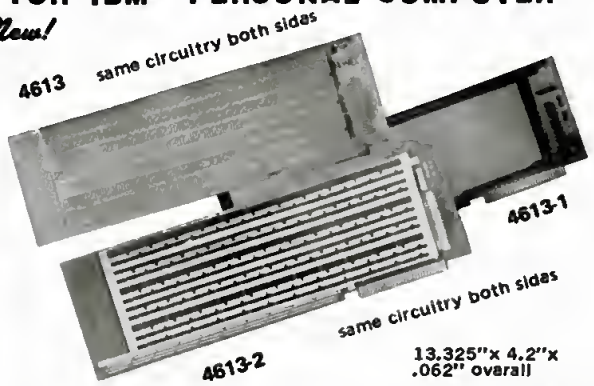

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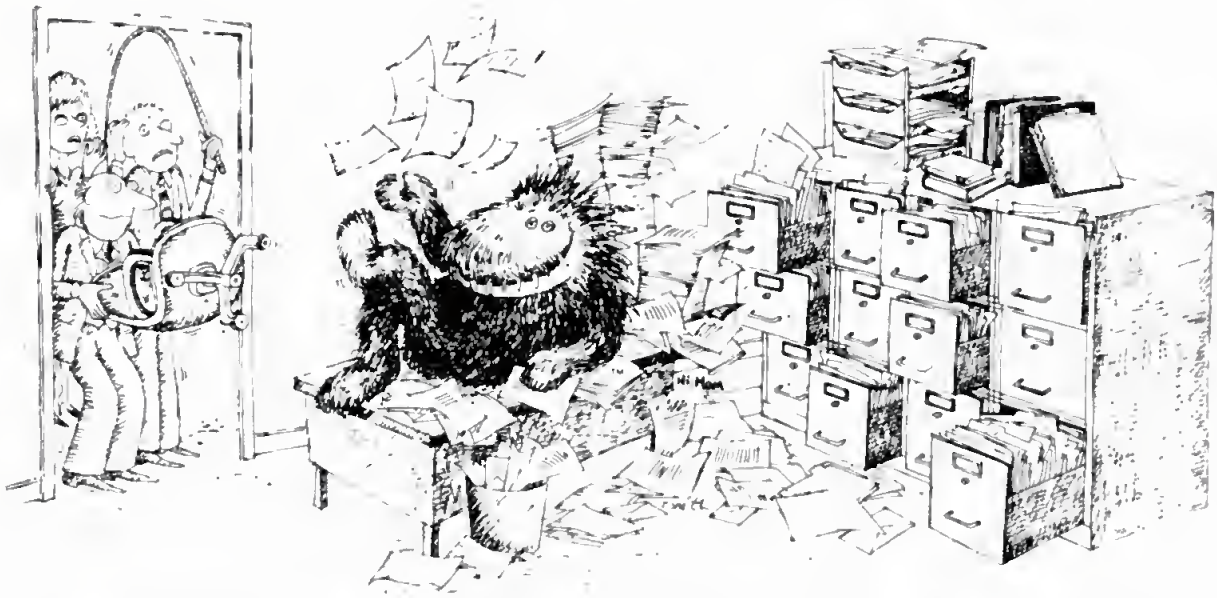

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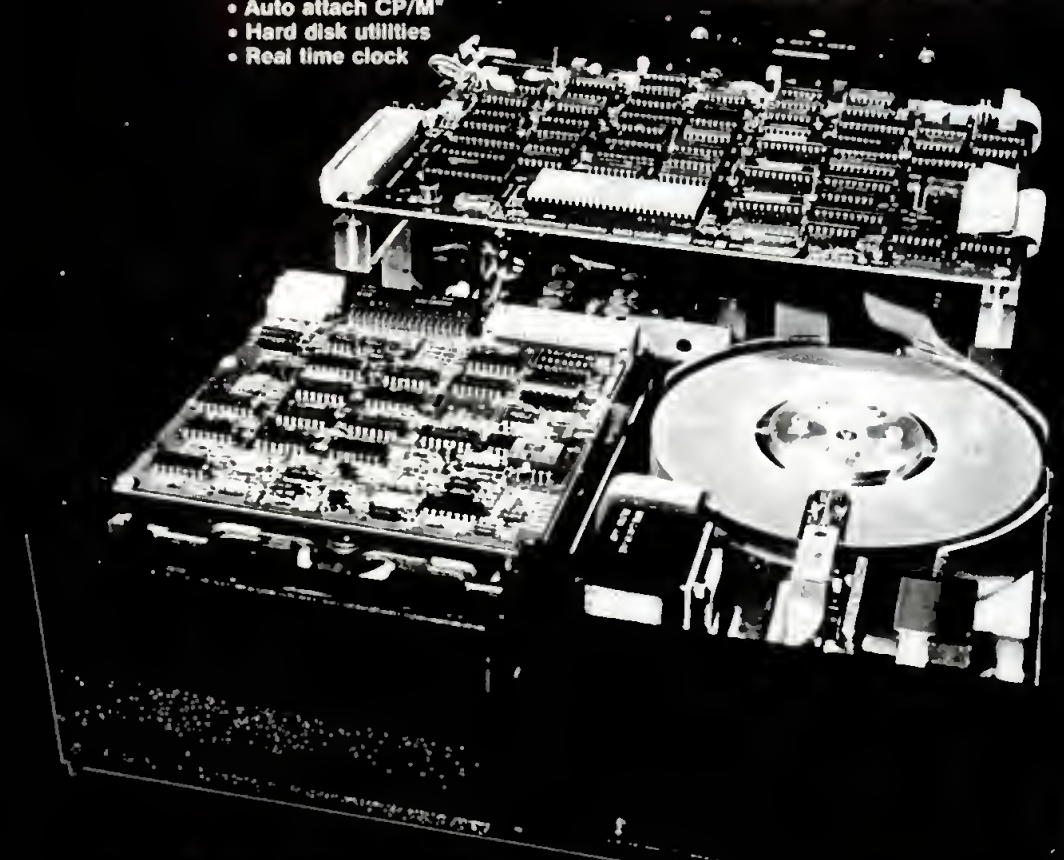

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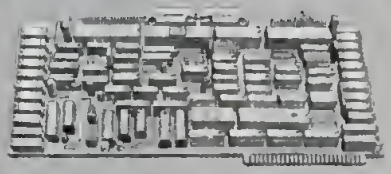

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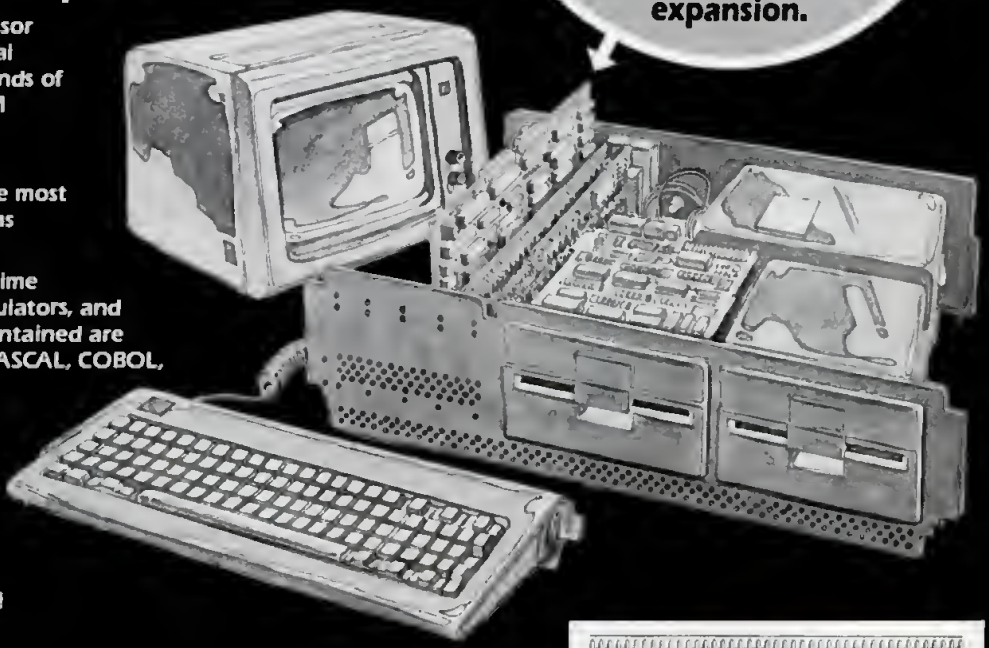

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The Grand And Glorious Crusade

ıe personol computer traces its roots back to the Altoir computer, first ınufoctured in Jonuory 1975 by MITS, Inc., o smoll compony thot came from the sert sonds of Albuquerque, New Mexico. For the next 2½ yeors, MITS, Inc. so ıminoted this new-found morket thot the compony literally defined personol mputing. David Bunnell ond Eddie Currie were both uniquely involved in the ginning of personol computing os MITS vice presidents. Together in this exclusive C series they tell the story of The Age of Altoir.

art Four.

While taking on all tha characteristics of a classic crusade, the early days of Altair were nerve racking, hectic, and frustrating. MITS as bringing computers to the masses, and e demand for microcomputers seemed ıquenchable. The staff worked long ours, 7 days a week, often for no mora an minimum wage. It wasn't at all unual to find 20 or 30 people at MITS any our of the day or night. While conducting tour of MITS, President Ed Roberts und himself stepping over the sleeping ody of a staff member in the software epartment. The body was that of Bill ates, co-founder of Microsoft.

hat's It Called?

When tha first Altair was completed, it as packed up and shipped off to Naw ork to Populor Electronics Technical ditor Les Solomon. Les was to use it in eparing a feature article for the January 75 issue. The first Altair was lost in tran-, and a second machine had to be frantilly configured and rapidly dispatched rtheast. A contest at MITS had failed to oduca a suitable name for this machina, Solomon was given the task of arriving an appropriate appelation. Whila dissing possibilities with family over din-r, his daughter suggested "Altair." It ems that the good ship Enterprise, beved among Trekies, was winging its way the star Altair on talevision that night. After considerable confusion, Altair ecama mora well known than MITS. lany people assumed that the Altair was oduced by an Albuquerque company amed Altalr. Almost no one knew what ITS stood for. Rumors indicated it meant "man in the street," which had some credibility because MITS had made it possible for many to own their own computers. MITS was actually a mnemonic for Micro Instrumentation and Telemetry Systems. It was the remaining artifact of an earlier Roberts' venture to produce telemetry equipment for model rockets.

SOME people thought it sacrilegious to sell technology as sophisticated as computers in a storefront environment.

The Age of Altair ushered in an information hunger explosion. Microcomputer clubs formed rapidly. It was not unusual to encounter groups without computers of any kind. They met regularly to discuss magazine articles, advertisements, and friends of friands who had ordered thair own micros. The Southern California Computer Society (SCCS) grew so fast it once predicted that within 2 years every man, woman, and child on the face of the earth would be an SCCS member.

Books, magazines, and pamphlets sold out the instant they appeared at computer stores. One of the most interesting early publications was Computer *Liberotion* by Ted Nelson. A collection of letters, articles, and drawings, it is a fascinating compendium of the state of computerdom in the mid-1970s. MITS produced its own publication, Computer Notes, with David Bunnell as editor. The first issue appeared in April 1975 and was soon to develop a large following. Ultimately it came to an abrupt and ignoble end.

The MITS-Mobile, a van equipped with a complete Altair system was pressed into service as a traveling road show. It was an instant success, beginning with a trip to Texas in late April and then the rest of the United States. Response was overwhelming. People would often follow the van from ona sita to another to attend tha computer seminar given by the "MITS-Boys," in spite of the fact that seminars were often several hundred miles apart. Although seminar admission was $9.75, the program was such a success devotees paid the expenses. Takan to the National Computer Conference (NCC) in May 1975, the van was presented as the "ultimate recreational vehicle."

Altairs For Sale

The first retail computer store, an Altair store, was an offshoot of Arrowhead Computer, started by Dick Heiser in West Los Angeles. This naw ventura, dubbad "The Computer Store," offered the Altair for a kit price of $439 while Intel offered the 8080 microcomputer chip for $350 in singla quantities.

Ed Roberts, creator of tha Altair, felt computer stores were an "interesting experiment," but he was uncertain about their future. Some people thought it was

Microcomputers ere highly complicsted devices. When you buy one you want to mske sure the menufacturer hss s solid reputstion for reliebility snd support. You wsnt to meke sure he'll be in your corner s yesr or two down the roed.

The Alteir 8800 from MITS wes the first general-purpose microcomputer. Todsy, there sre more Altair computers up snd running thsn sll the other generel-purpose microcomputers combined. Todsy, Alteirs sre successfully used for literally hundreds of personal, business, scientific, snd industrisl applicstions.

Becsuse we ere so popular, many people hsve tried to copy us. The peges of microcomputer msgezines sre full of sdvertisements for Altair compstible devices and Altair imitation computers.

Because we sre NUMBER ONE, we offer e much brosder renge of products and services thsn sny of our competitors. One msnufecturer might be sble to copy one of our computers. Another might be able to produce a working memory csrd. But no one cen copy the overall Alteir concept.

The Altair concept is a system concept eimed et prscticsl, cost effective epplicetions. That's why we offer three msinfrsmes including the Altsir 680b, Alteir 8800e, snd Altair 8800b; ten periphersls including s multi-disk system; snd over 20 plug compstible modules including our new, low power 16K ststic memory bosrd. That's why we sre the only microcomputer msnufacturer to go to the extrs expense of providing our customers with quality, higher language softwsre.

When you buy sn Altsir, you're not just buying a piece of equipment. You're buying yeers of reliable, low-cost computing. You're buying the support of the NUMBER ONE msnufscturer in the microcomputer field.

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The above MITS "number-one" od ran in virtually every publicotion in the compute industry press os well as in the proliferating hobbyist magazines. It attracted several ocquisition-hungry electronic conglomerates, one of which gobbled up the company.

acrilegious to sell technology as sophisti-ated as computers in e storefront environ-nent. Heiser's initiel order was for $5,000 vorth of Altair equipment. Evaryona at MITS was astounded when, a few days ater, a second order eppeered from Arrowhead. Paul Terrel soon started e sec-nd store in Northern Celifornia, which ecame the first Byte Shop.

Bruce Seels errived in New Mexico to gn up es en Alteir deeler in Knoxville, annessaa. Latar ha startad Saels Elec-onics, which provided relieble memory or the eerly Alteir systems.

Richard Stafford and Jim Dunion ap-eered at the MITS-Mobile seminar in At-nte. Their arrival was to cause the locel MITS representativa enxiaty. Ha quickly ointad out that troubla would undoubt-dly ensue et the seminar since Stafford nd Dunion had purchased two 4K dy-amic memory boards; although they ere assembled by different techniciens, either could be mede to work. During in-rmission they were invitad to make their ase. Curiously enough, this initiel an-ounter andad on e friendly but firm nota hat either they receive satisfection or thay ould make troubla.

Shortly theraaftar, Stafford, Dunion, nd others formed The Computer Systems enter, en Altair store in Atlanta, Georgia. hey were joined by Ben Dyer, who wes to ecome the store meneger. This eventual-led to the formation of Peachtree Soft-ere end Reteil Sciences. Todey The omputer Systams Cantar has baen short-ned to TCS end is e softwere compeny riving in Houston, Texas.

In the midst of this flurry, Motorola an-ounced the 8800 microprocessor, its entry the microcomputar race. This chip was elieved by meny to be a substantiel thraat the Intel 8080. As e hedge egeinst this reet MITS engeged in e crash program produce an Altair with a 6800 chip, lled the Altair 680. BASIC was soon un-er development for this machine by Ric eiland of Microsoft. It was sold to MITS r $32,000, in contrast to arrangamants ITS hed made with Microsoft for 8080 ASIC under an exclusive license agree-ent. The subtle distinctions in en exclu-ve license cen prove cruciel; BASIC is ovan into many aspects of our story.

The 680 wes to prove an inappropriate e of MITS' resources, and although per-aps 1,000 mechines were shipped to en-thusiastic hobbyists, today they are virtu-ally nowhere to be found.

We're Number One

An eerly discussion et MITS evidenced concern that tha world ba told MITS was number one in the microcomputer field. One fection held thet the generel public needn't be told what they elready knew, while the opposing view contended that an open stetement to the market would have a number of beneficial effects. The

EVERY periodical on microcomputers would invariably make reference to MITS/Altair.

edvertising depertmant soon provided whet was to becoma known at MITS as the "number-one ed."

Every periodical on microcomputers would invariably make references to MITS/Altair. The number-one ad soon appeared in meny publicetions. Phone cails, iatters, and visitors flooded into an otherwise dry Albuquerque.

Opportunists Hang On

Most entrapreneurs have certain common characteristics: They are extremely interested in money, have short attention spans, are sometimes paranoid, ere poor et detaiis, are unable to carry projects through to logical conclusions, change their minds frequently, bore easily, and will seldom telk of enything other then business. They are fundamentally opportunistic and will jump at any and all deals end roeds to feme end financial success. Paradoxically, they ara often unwilling or unabla to turn over their business to outsiders, or enyone else for thet metter.

The many opportunities that were brought to Albuquerque end to MITS' front door were viewed with a jaundiced, though not totaily indifferant, eye. The number-one ad and the vast exposure of the MITS/Altair name in the trede press stimulated many offers of ecquisition. One such offer was presented by representatives of Pertec Computer Corporation. It eppeered at the outset to be the most serious and substential offer to date. This occurred against an increasing proliferation of competitive machines and a nagging fear that Texas Instrumants (TI) would soon enter and immediately dominate the microcomputer market.

TI had epproached MITS to determine whether en Altair-like product wes of interest to MITS and its merketplaca. Tha technology of tha 9900 plus a lack of softwere was considered too severe to warrant such en effort. Nonetheless, when MITS had 6 million in sales and TI dropped 12 million into tha calculator market in an apparent effort to dominate the merkat, it was very intimideting.

The Pertec overture was viewed with ceutious optimism. The first, somewhat mysterious visit wes followad by additional visits and e formal offer. Apparantly the president of Pertec, Ryal Poppe, had become intrigued with the microcomputer market and realized the fect that Partec produced the floppy and herd disks used in the MITS systems would provide e ceptive customer for Pertec products and afford entry into the microcomputer market for small-business systems.

In en enthusiestic determination to entar this new merkat, Poppa mada a racommendation to the boerd that Partec acquire MITS. Tha board responded with e number of pointed questions, which in turn resulted in a number of staff members being sent to Albuquerqua to varify that the president had used sound business judgment. The staff stayed long enough to gether the informetion naeded to support Poppa's position end, without further investigation, departed.

Pertec was then negotieting the purchese of ICOM, e California-besed company that was aiso a substantiai customar for Pertec floppy disk drives. ICOM and Shugart were negotieting to meet future drive requirements with Shugart products. The ICOM acquisition by Pertec would provide e second captiva customar for Pertec floppy drives.

Although unwittingly, ICOM was also to play a role in the eventual demise of MITS. */PC*

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Index To Advertisers

Aegis Systems....166
Aerocomp....161
Alpha Software Corp....6,6
Alphanetics....161
Amdek Corporation....60
Apparat, Inc....14, 15
Apstak, Inc....64
Arlington Softwera Systems....107
Armonk Corporation....160
Arrix Logic Systems, Inc....130
Artificial Intelligence Research Group....210
ASAP Computer Products, Inc. 67
Ashton-Tata....2, 3
Aspen Software Co. 61
AST Research Inc. 76
Autometed Business Mechines Incorporated....223
Automated Office Systems....84
B.C. Systems Inc. 135
B.T. Enterprises....161
Basic Business Software, Inc. 68
Benchmark Creations....164
Best Programs....156
Blaise Computing Inc. 101
Bottom Line, The....202
Business Master....116
C & C Software....146
Calabrese Publications....66
California Micro Computer....204
ColorCorp....16
Comprehensive Software Support....102, 156
Compucart....206
Compumax....204
CompuServe....216
Computer Case Company....141
Computer Control Systems, Inc....174
Computer Innovations, Inc....105
Computer Technology Innovations....113
Computer Systems Design, Inc....204
Computerized Management System....84
Computerworld Internetional, Inc....116
Computrickx Inc. 170
Comsen, Inc....70
Condor Computer Corporation....164
Contaxt Manegement Systems....22, 102
Continental Software....Inside Front
Coosol, Inc. 136
Corvus Systems....16
Creativity Unlimited....126
Cuesta Systems Incorporated....162
Curtis Manufacturing Company, Inc....170
Cybernetics, Inc. 66
DP Computer Services Co....63
Datamost....65
DataSource Systems....127
Davong Systems, Inc. 133
Deystar Systems, Inc. 210
Design Data Systems....150
Diemond Software Supply Co. 117
Digital Marketing 42
Digital Research....13
EDS 34
Electronic Specialists, Inc. 100
Emerging Technology Consultants, Inc. 62
Engineering Science, Inc. 63
Escon Products, Inc. 60
Fantasia Systems Incorporated....66
Flagstaff Engineering....102
Frank Schiele Software....207
FriendlySoft, Inc. 66, 152
FTG Data Systems....36
Graphic Software, Inc. 140
H&E Computronics 163
Hercules Computer Technology....175
IBM 6
I B Magazette 166
ICR FutureSoft....110
Infocom....104
Infosoft Computer 161
Innosys, Incorporated....46
Interfece, Inc. 106
Intermedia Systems....132
International Software Allience....168
INTEK Manufacturing Company 168
Ipex International, Inc. 142
John D. Owens Associates, Inc. 126
Johnson Associetes....113
Laboratory Microsystems....166
Leading Edge Products, Inc. ....Inside Back
Lifetree Software Inc....167
Link Systems 206
Mecrolink....27
Meynard Electronics....126
Med Systems Software....166
Memory Technologies, Inc. 120
Micro-Ap, Inc....77
Micro Control Systems, Inc....162
Micro Express 137
Micro-G 173
Micro House....200,201
Micro Match....141
Micro-Z Applicationa 121
Micro Z Company 116
Microcomputer Business Internationel....119
Microsoft, Inc. 1
Microsystems Distributors 124
Miller Microcomputer Services 172
Mountain Computer, Incorporated....46
N.F. Systems, Ltd....126
Nationel Software Innovations....113
Netional Technology Seles....145
NEC Information Systems, Inc....43
Network Consulting Inc. 126
NH III Computer Accessories 106
Norell Data Systems....207
Norton Utilities, The 205
Omric 177
Owl Software Corporation 134
PBL Corporation....100
PC-Logic Systems....136
(PC) Squered 160
PC Connection....136,208
PDS Inc. 146
Percom Data Company, Inc. 16
Peripheral Tech 136
Periphex Inc. 167
Personal Data Systems, Inc. 205
Personna....160
PERSYST, Inc. 170
Prodata Inc. 173
Professional Micro Systems 146
Pure Data Ltd....162
Quadram Corporation 40,41
Quala....62
Quentum Softwere Systems, Inc. 122, 123
Qubie' Distributing....166
QuCeS Inc. 216,217
Red Baron Computer Products....166
Robert J. Brady Co. 118,142
Rocky Mountein Software Systems....177
Seattle Computer....115
Sigma Designs....144
Sofstar, Inc. 93
Softrend Inc....165
Software Laboratories, Inc. 151
Software 'n Stuff 174
Sorcim Corporation....20,21
Spectra Marketing....216
Squire, Buresh Associates, Inc....144
Science Research Associetes, Inc. 35,37
Stack Works....174
Starware 130
SuperSoft....215
Synergistic Softwere 62
Systemics....68
Tall Tree Systems....62
Tellgrass Technologies Corporation....166
TCI Software....207
Tecmar Inc. ....Back Cover
Telecon Systems 177
TexaSoft....108
Ticom Systems, Inc. 139
Vector Electronic Company 206
Veritas Technology Inc....100
VisiCorp....7
Vista Computer Company, Inc. 175
VR Data Company, Inc. 36
Washington Computer....106
Watsoft Products Inc....161
Worldwide Software Publishing, Inc. 136
XCOMP, Inc. 61
Zobex 142

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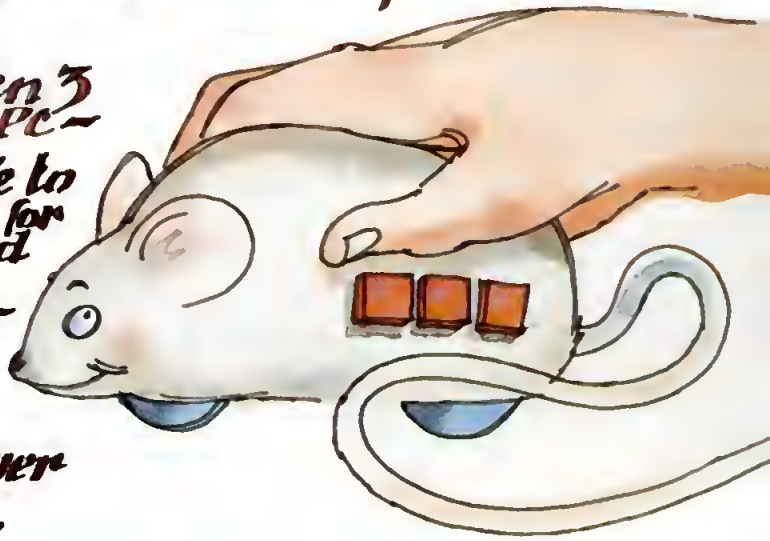
Wish List

A monthly PC!
Michel J. Hanrahan
West Swanzie, N.H.

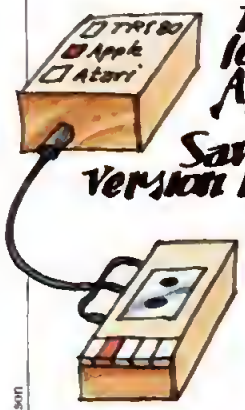
The color display card and the games card should be combined on the same card. Games and color go together like mom and Apple pie.

D. Bruce Yolton, Phila. Pa.

A 'mouse' for use with the PC (such as the one used with the Xe Star terminals) for cursor movement menu selection without use of a keyboard. Connecti could be made via the game I/O adap tor. Wide business personal use.



A box that connects between 3 cassettes and my IBM PC~



makes it possible to load in programs for Apples, TRS 80's and Alaris~ Save program con- version time between the TRS80 & the PC.

~Lincoln Bauer
Holland, Wi.

Illustration: Marc Erickson

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PROWRITER: Parallel and serial interface standard.

PRICE

Heh, heh.

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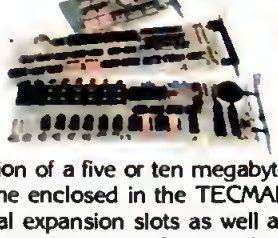

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